MAINTENANCE AND OPERATION
INSTRUCTION MANUAL

Device Manager

Compatible with:
DB4004, DB7000, Radio Explorer II

DEVA®
BROADCAST

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Introduction

DEVA Broadcast Ltd. was established in 1997 as a broadcasting and telecommunications equipment importer for Bulgaria and Eastern Europe regions. Subsequently, DEVA Broadcast Ltd. has developed and produced a wide range of low and mid - power transmitters, RDS/RBDS Encoders and Decoders, Modulation Monitors, Remote Controls, Site monitoring and other systems for many companies around the Globe. Our experienced and innovative engineers accomplish their bright ideas through successful engineering, marketing and management at DEVA Broadcast's corporate headquarters in Bulgaria.

During the last ten years our company's products have become our partners' best-sellers. After a detailed marketing analysis, our team has decided to launch its own brand products based on the latest technologies in the broadcasting business. We have dedicated our efforts and expertise to the design and development of a complete line of high-quality and competitive products for FM and Digital Radio, Radio Networks, Telecommunication Operators and regulation authorities. We pride ourselves on our post-sales support and relation to the clients which have won us due respect and our market authority position.

Since 2003 DEVA Broadcast Ltd. has been ISO 9001 certified.

The contractors of DEVA Broadcast Ltd. are satisfied with the permanent business comfort and to their own confession they owe it to a great extent as well as their prosperity to the loyal partnership of our company.

General Information

DEVA Device Manager is software to control several devices from DEVA's wide range product line. Developed to support an increasing demand for data processing applications for FM Monitoring, DEVA Device Manager is fully compatible with:

- DB4004 - DSP-based FM Radio Monitoring Receiver;
- DB7000 – FM Radio Re-Broadcast Receiver;
- Radio Explorer II – Mobile FM Radio Analyzer.

Conformable to the level of access of each device, DEVA Device Manager automatically adjusts to the constraints defined. It switches instantaneously to the desired frequency and overviews all the predefined parameters as values or as a graph, distributed over time. The map interface shows you at a glance the status of your radio network. It also displays all the critical events or alarms that might have taken place and need to be checked immediately. The easy-to-use interface allows quick and easy connection to all of the controlled devices.

DEVA Device Manager is mouse navigated and utilizes user-friendly controls and drop-down menus. The Mouse clicks and sliding, control the movement of the data cursor for instant readout of both the X and Y axes. The software enables the user to define both minimum and maximum threshold values for all time series functions.

Aimed at facilitating the use of our products, DEVA Device Manager Software is free of charge. The latest release can be found on our website www.devabroadcast.com or on a supplied CD accompanying the purchased product. The downloaded software can be used by customers who have an already installed DEVA Device Manager, for the purposes of software update or by clients who have recently purchased a DEVA device.

This Manual is intended to:

- Guide you through the installation process;
- Help you with the initial setup of the Software;
- Familiarize you with the supported applications.

PLEASE NOTE that the supported functions differ, depending on the used device and might be contextually different. An explanatory mark at the beginning of each application will indicate which device supports the particular function that is being explained.

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Loading and Running The Software

DEVA Device Manager Software is provided to our customers free of charge. The latest release can be found on our website www.devabroadcast.com and the supplied CD.

MINIMAL SYSTEM REQUIREMENTS

Pentium(R) Processor or Compatible
Windows XP and above
1024MB RAM
100MB free hard drive space for installation
16 or 32-bit graphics color depth
1024 by 768 pixels screen resolution
Screen DPI setting to 96 dpi
Universal Serial Bus 2.0

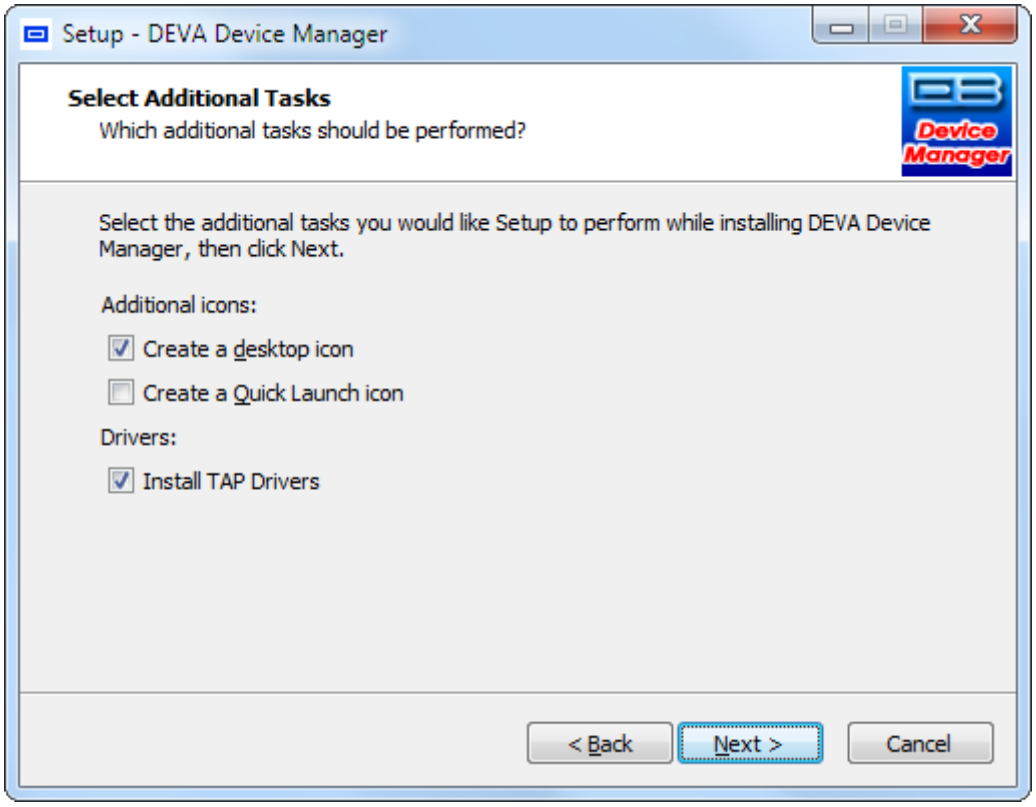
INSTALLING THE SOFTWARE

The installation process is fairly simple and identical for all supported by the software devices.

1. Use the Installation file which can be found on the supplied CD or downloaded from www.devabroadcast.com/downloads;
2. Find **DEVA Device Manager** file, double click on the installation file to launch the *Wizard*;

Setup - DEVA Device Manager
Device Manager
Welcome to the DEVA Device Manager Setup Wizard
This will install DEVA Device Manager version x.x.x.xx on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

3. Accept the default recommendations and click "**Next>**" in the end of each step;
4. When asked to place an icon on the Desktop of your computer and Install TAP Drivers, make sure that the check boxes are enabled and click "**Next>**";

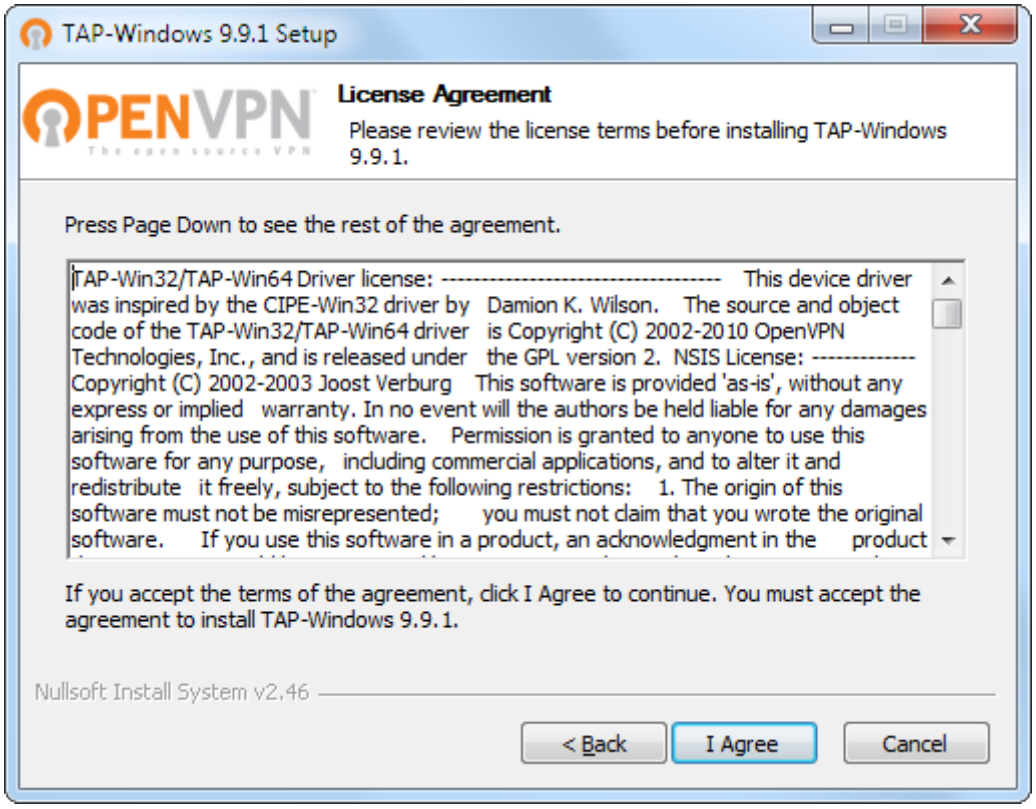

Setup - DEVA Device Manager
Select Additional Tasks
Which additional tasks should be performed?
Device Manager
Select the additional tasks you would like Setup to perform while installing DEVA Device Manager, then click Next.
Additional icons:
Create a desktop icon
Create a Quick Launch icon
Drivers:
Install TAP Drivers
< Back
Next >
Cancel

NOTE: The TAP Drivers should be installed in order for the computer to communicate with the device trough the USB port. If you have already installed the TAP Drivers on your PC, disable the corresponding box and press "**Finish**". If not, continue with the steps below:

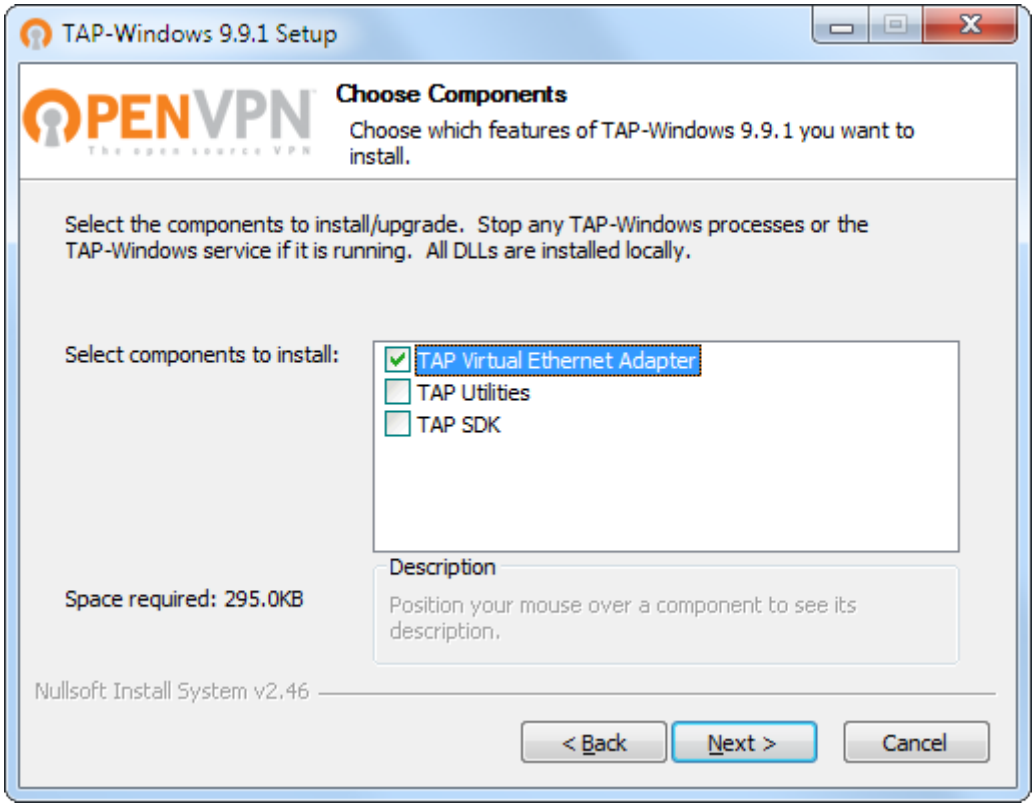
5. Click **Install** to continue with the installation process;
6. TAP Windows Setup Wizard will appear. Click "**Next>**";

TAP-Windows 9.9.1 Setup
Welcome to the TAP-Windows 9.9.1 Setup Wizard
This wizard will guide you through the installation of TAP-Windows, an Open Source VPN package by James Yonan.
Note that the Windows version of TAP-Windows will only run on Win 2000, XP, or higher.
Next >
Cancel

7. Accept the License Agreement;


TAP-Windows 9.9.1 Setup
OPENVPN
License Agreement
Please review the license terms before installing TAP-Windows 9.9.1.
Press Page Down to see the rest of the agreement.
TAP-Win32/TAP-Win64 Driver license: ---------- This device driver was inspired by the CIPE-Win32 driver by Damion K. Wilson. The source and object code of the TAP-Win32/TAP-Win64 driver is Copyright (C) 2002-2010 OpenVPN Technologies, Inc., and is released under the GPL version 2. NSIS License: ---------- Copyright (C) 2002-2003 Joost Verburg This software is provided 'as-is', without any express or implied warranty. In no event will the authors be held liable for any damages arising from the use of this software. Permission is granted to anyone to use this software for any purpose, including commercial applications, and to alter it and redistribute it freely, subject to the following restrictions: 1. The origin of this software must not be misrepresented; you must not claim that you wrote the original software. If you use this software in a product, an acknowledgment in the product
If you accept the terms of the agreement, click I Agree to continue. You must accept the agreement to install TAP-Windows 9.9.1.
Nullsoft Install System v2.46
< Back
I Agree
Cancel

8. When asked to select the installation components check the "**TAP Virtual Ethernet Adapter**" box and click "**Next>**";


TAP-Windows 9.9.1 Setup
OPENVPN
Choose Components
Choose which features of TAP-Windows 9.9.1 you want to install.
Select the components to install/upgrade. Stop any TAP-Windows processes or the TAP-Windows service if it is running. All DLLs are installed locally.
Select components to install:
TAP Virtual Ethernet Adapter
TAP Utilities
TAP SDK
Description
Position your mouse over a component to see its description.
Space required: 295.0KB
Nullsoft Install System v2.46
< Back
Next >
Cancel

9. Accept the default recommendations and click "**Next>**" in the end of each step;
10. Click "**Finish**" to complete the **TAP Windows Setup Wizard**;
11. Finally, launch the program.

Setup - DEVA Device Manager
Device Manager
Completing the DEVA Device Manager Setup Wizard
Setup has finished installing DEVA Device Manager on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Launch DEVA Device Manager
Finish

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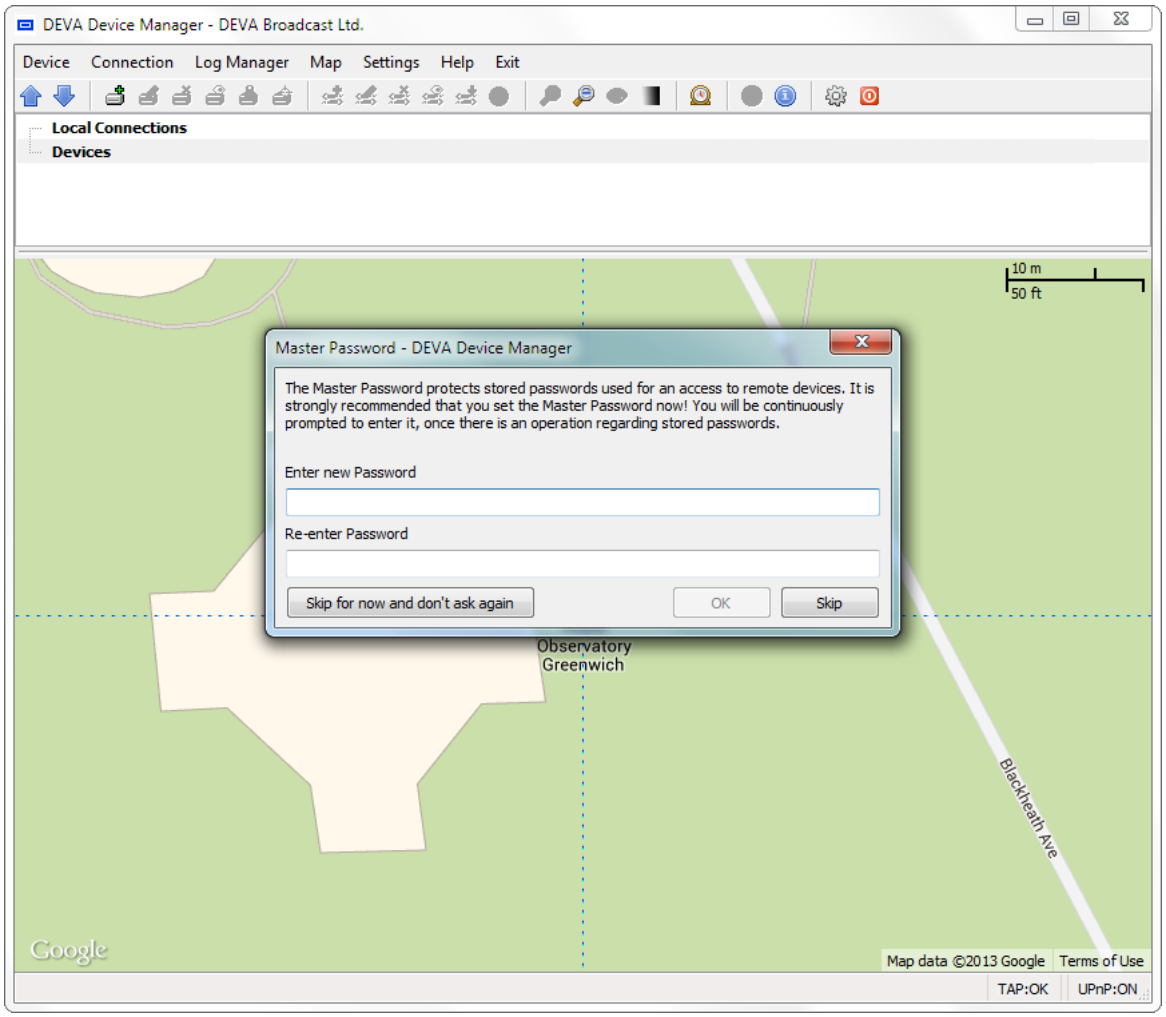
DEVA Device Manager Software Usage

After the installation process is completed, a shortcut to DEVA Device Manager will appear on the desktop of your PC.

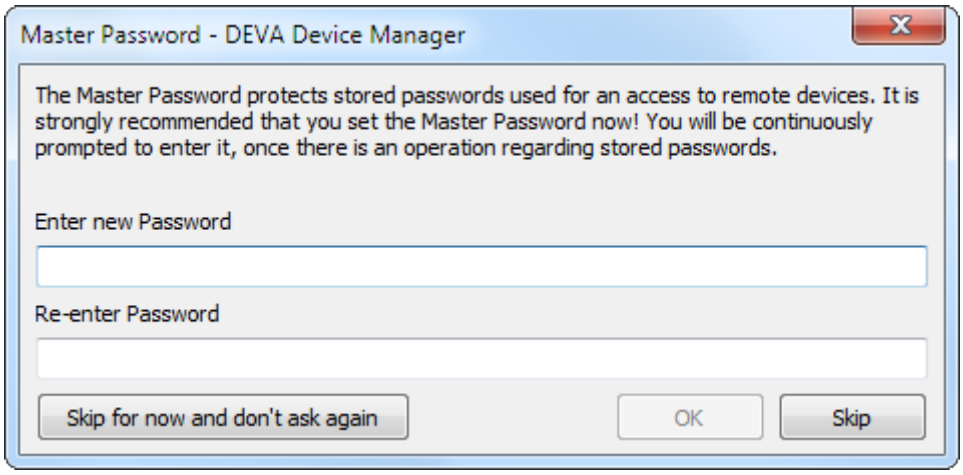
Double click on the shortcut to run the Software. Subsequently, the main application window will appear, followed by a dialog window requiring a Master Password (see “Master Password” on page 13). Most of the functions would be disabled since no devices have been listed in the DEVA Device Manager so far.



Getting Started

MASTER PASSWORD

The Master Password protects stored passwords used for an access to remote devices. If you share a computer with anyone, it is recommended that you use a master password.


Master Password - DEVA Device Manager
The Master Password protects stored passwords used for an access to remote devices. It is strongly recommended that you set the Master Password now! You will be continuously prompted to enter it, once there is an operation regarding stored passwords.
Enter new Password
Re-enter Password
Skip for now and don't ask again
OK
Skip

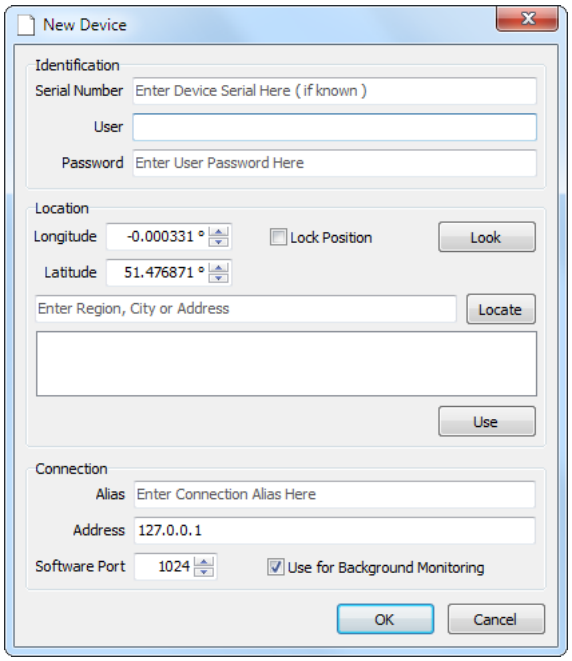
We recommend that you enter the password when DEVA Device Manager is activated for the first time. Otherwise, you will be continuously reminded to enter it any time there is an operation regarding stored passwords.

NOTE: Please make sure you remember the Master Password you have set. If you forget your Master Password, you would not be able to access any of the information protected by it.

If you have enabled the UPNP function, DEVA Device Manager will find and add automatically all supported devices connected to your PC trough USB or LAN (see "Monitoring" on page 36). In case of a failure, remote device can be added manually by two methods – New Device or Import Device List. These options are explained in detail below:

NEW DEVICE

Press the "New Device" button . A dialog box requiring information about the device will appear. The requested data is not obligatory but might be required in order for an assigned task to be completed.



Identification

Serial Number - this field could be left blank. It will be automatically assigned the first time when you connect to a device via DEVA Device Manager Software. Once assigned, the Serial Number cannot be changed;

User and Password – credential required to access the device;

Location

Longitude and Latitude – if known the coordinates of the device location could be specified;

Lock Position – selecting this option will "lock" the device on its current position on the map. This will prevent repositioning the device by mistake;

Look – the currently entered Longitude and Latitude will be used as a center of the Map.

Locate – Enter Region, City or Address and press the "**Locate**" button. All results found will be listed. Select the required location and press the "**Use**" button in order the currently selected location to be filled in the relevant fields.

Connection

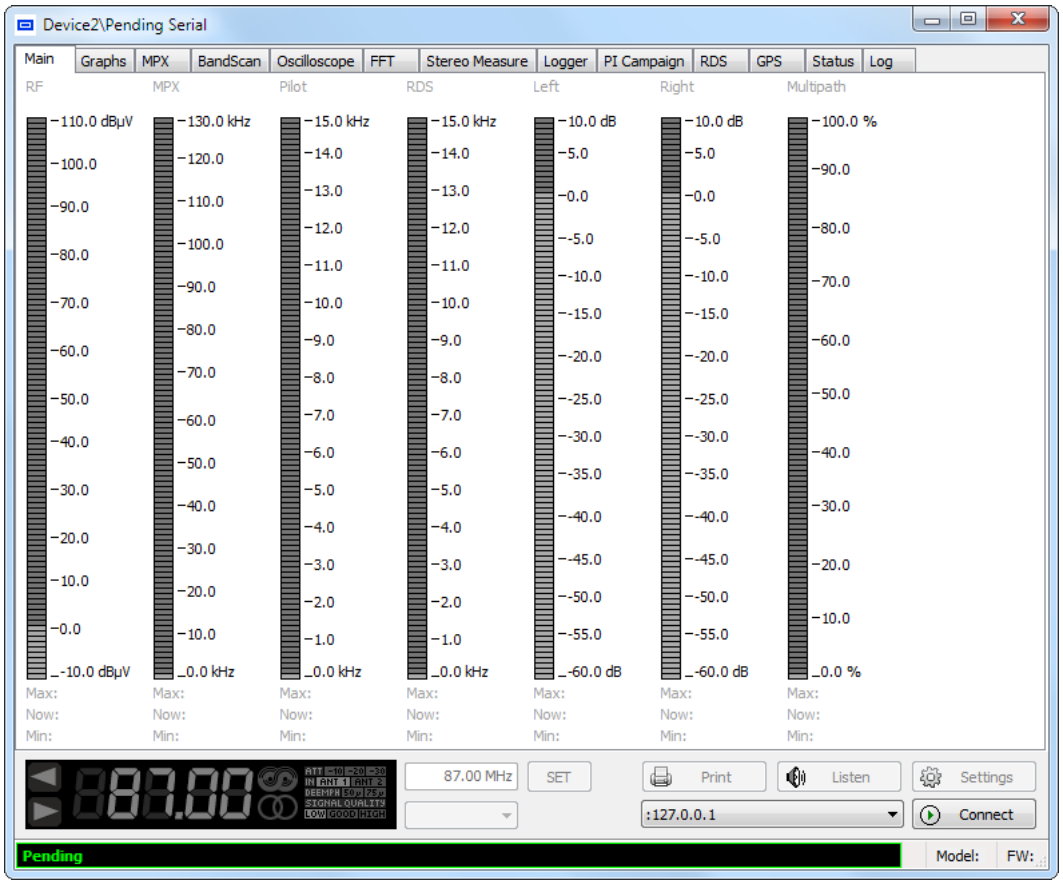
Enter the required data (for further information on the connection settings refer to "New Connection");

After the needed parameters are entered, the device will appear in the Device List and on the Map. There are two options of entering the device:

1. Select the preferred device and click on “View Device” button ;
2. Double click on the connection listed below the device.

NOTE: Once a new device is defined an automatic connection to it will be added. For further information about the “Connection” usage refer to “Connections Managing” on page 19.

Once the device is entered, the Device Control Window will be displayed.



For further information refer to “Device Control Window” on page 41

PLEASE NOTE that the appearance of the Device Control Window differs depending on the currently selected Device.

EXPORT/IMPORT DEVICE LIST

This option is very useful for those users who want to install DEVA Device Manager on several computers and monitor the condition of devices installed on different locations.

Once you have defined all devices and placed them on the Map, you could export all settings and import them into other PCs, with DEVA Device Manager Software already installed.

Export Device List

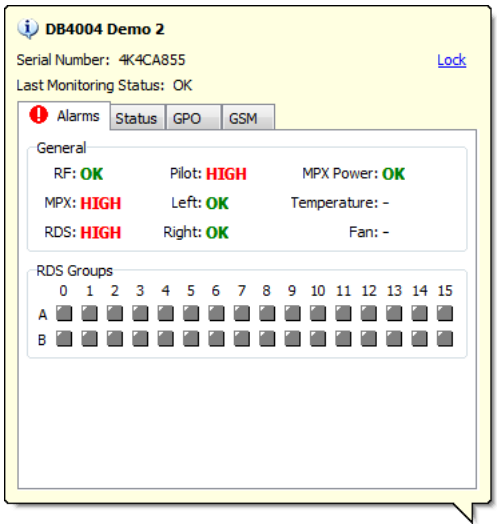
1. Click on "**Device**" menu and select "**Export Device List**";
2. Enter your Master password and press OK;
3. Save the file.

NOTE: Once the Device list has been exported all passwords in the resultant file will be visible to anyone who has access to it.

Import Device List

1. Click on "**Device**" menu and select "**Import Device List**";
2. Select the desired file and press OK;
3. The information will be transferred and displayed on DEVA Device Manager main window.

CURRENT STATUS



Information about the current status of the device will be displayed by pointing with the cursor on the desired device placed on the Map. The information provided is being updated periodically, and the contents depend on the selected device/connection.

In order to indicate the current status of the device on the Map, the software utilizes the following color coding system:

Blue – No available information or the connection is not being monitored;

Green – No alarms and status acquisition conditions are detected.

Red – A problem (alarm or connection fail) with the device has been detected.

Device Managing

EDIT DEVICE

Used for editing of the device's current information.

REMOVE DEVICE

Select the device and press the "Remove device" button . A dialog warning window will appear. Confirm that you want to delete the device and wait for the process to complete.

VIEW DEVICE

A click on the "View Device" button will open the "Device Control Window".

LOCK/UNLOCK DEVICE

Used for "locking/unlocking" of the device on its current position on the map.

1. Set the device at its position on the map;
2. Select the device from the list;
3. Press the "Lock"/"Unlock" button .

Once "Lock" action is performed the device should be "unlocked" in order for the current position to be changed.

LOCATE DEVICE ON MAP

This function is very useful when several devices are listed.

1. Select the desired device from the Device List;
2. Press the "Locate Device on Map" button .

The Software will automatically position the Map as to the device to be displayed in its center.

Connections Managing

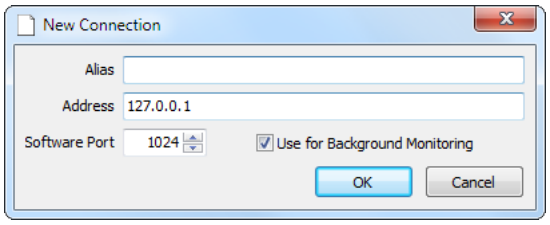
Once a new device is added, the DEVA Device Manager can utilize several sub-connections with different functions which will facilitate the use of the device.

NEW CONNECTION

Several connections for each device could be added. In order a new connection to be added the ”New connection” button should be used.

NOTE: Although several connections for different purposes can be utilized (one for monitoring and one for downloading of the Log files, for example), only one connection at a time can be used for connecting and maintenance of the device.

A window requiring information about the connection will appear:



- **Alias** – a user-defined name that identifies the connection;
- **Address** – IP Address or Host Name of the device;
- **Software port** – The default value of the Software Port is 1024;
- “**Use for Background monitoring**” check box – we recommend you to leave this function enabled. Using background channel for receiving data from the device without interrupting its working process this option is ideal for monitoring of the current device status. (The function is enabled by default.) The “Eye icon”, indicating that the function is in use, will appear in front of the connection.

Complete the needed information and press OK.

EDIT CONNECTION

Used for editing of the connection’s current information – new Alias, Address / Host Name and Port could be set from here.

REMOVE CONNECTION

Select the connection and Press the “Remove connection” button . The connection will be deleted immediately.

MONITOR/UN-MONITOR CONNECTION

Select the connection to be used for background monitoring of the device and press the “Monitor Connection” button . (see “Monitoring” on page 36)

DOWNLOAD LOGS

Select the connection to be used for downloading of the log files and press the “Download Logs” button . (see “Log Manager” on page 22)

CONNECT

Control option used for connecting/disconnecting with the currently selected device through the selected connection.

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Map

Each device is visually represented on the Map. This is an additional tool for fast evaluation of the currently selected device – condition, location, etc.

ZOOM IN/OUT

– Control option that will zoom in the Map image.
– Control option that will zoom out the Map image.

FIT ALL

– Control option that will position the Map in such manner as to display all devices situated on the map.

GRAYSCALE MAP/COLOR MAP

Having in mind that visual perception differs from person to person, the used map could be gray-scaled via this option, allowing easy monitoring of the current status and position of the devices.

The button is with dual use – once the grayscale function is applied, the same button would be referred as and used for “Color Map”.

Log Manager

NOTE: This function is not supported by DB7000 FM Radio Re-broadcast receiver.

The Log Manager is used for downloading of device log files and for visualizing them. The log files contain records about events, such as user access or data manipulation as they occur, to serve as an audit trail, diagnostic device, or security measure.

In order for the log files to be downloaded via DEVA Device Manager, the following steps should be completed:

1. The User name and Password corresponding to the selected device will be required and should be fixed/specified. (see “Edit Device” on page 18)
2. The connection used for downloading of the log files should be marked with the “Download LOGs” function. (see “Connections Managing” on page 19) Once this is done, the following icon will be displayed in front of the name of the connection. This function can be disabled by selecting “Stop Download LOGs”;
3. Set the downloading recurrence of the Log files through Settings menu> section “Applications”> sub-section “Log Manager”. (see “Main Application Settings” on page 33)

NOTE: The Log Manager can also be used for visualizing of old LOG files uploaded by the user. (see “Import Log File” on page 23)

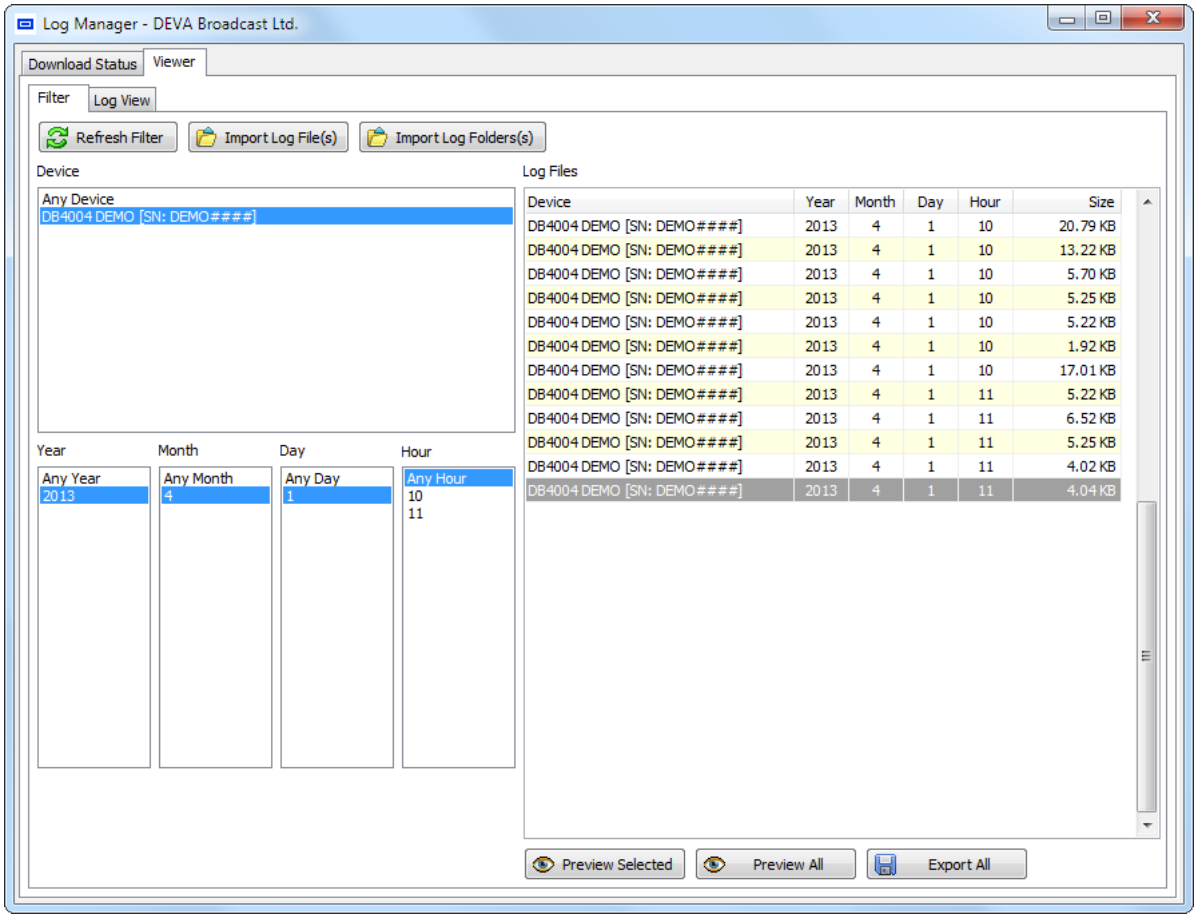
DOWNLOAD STATUS

The current status and progress of all connections marked with “Download LOG’s” is displayed. The plus sign placed in front of the connection can be expanded in order for further information about the download status to be displayed.

On the bottom side it is placed the “Stop Download” button used for stopping of the selected download.

VIEWER - FILTER

This menu enables the user to select the files to be visualized via the DEVA Device Manager.



Refresh Filter button – updates the displayed information - generally this button is not used, but if a log download is currently running, the newly downloaded logs will not be listed and the "Refresh filter" button should be used.

Import Log File(s), Import Log Folder(s) buttons – if the logs are downloaded by other software or archived, the user can upload them "manually": (see "Export All" on page 24)

- one by one – pressing Import Log Files(s);
- or in groups - pressing Import Log Folder (s).

NOTE: Each log file contains information about the device from which originates. If the "Log Manager" detects that the device is included in the main Device List of the program, it will automatically display its name. If the device is unknown to the software, as a name will be used the serial number of the device - for example: SN: 4K4CA827.

Device – Contains a list of all the devices for which there is available information in the database logs.

Log Files - Contains a list of the available log files. The filtration method is user-defined and explained in details below.

In order to proceed with the visualization, the log files should be limited to one or several, all downloaded within 1 day and for 1 device only.

This requires a filter to bind to the chaining (cascading) option i.e. when a particular device is chosen, this will unlock the function Year (only the stored information by years for this device will be available). After selecting the Year parameter, function Month will be enabled. Thus, accordingly Day and Hour will be enabled. The **Log Files Section** will be updated, depending on the defined filtration.

Preview Selected button – The log files could also be visualized independently. This option is available whenever a file is specified in the Log Files Section. Pressing the button will activate the Log View.

Preview All button is directly related to the "within 1 day and for 1 device only" rule and is activated only when a specific day is selected (Any Day cannot be applied). Thus, the Log Files will contain logs of a particular day and device.

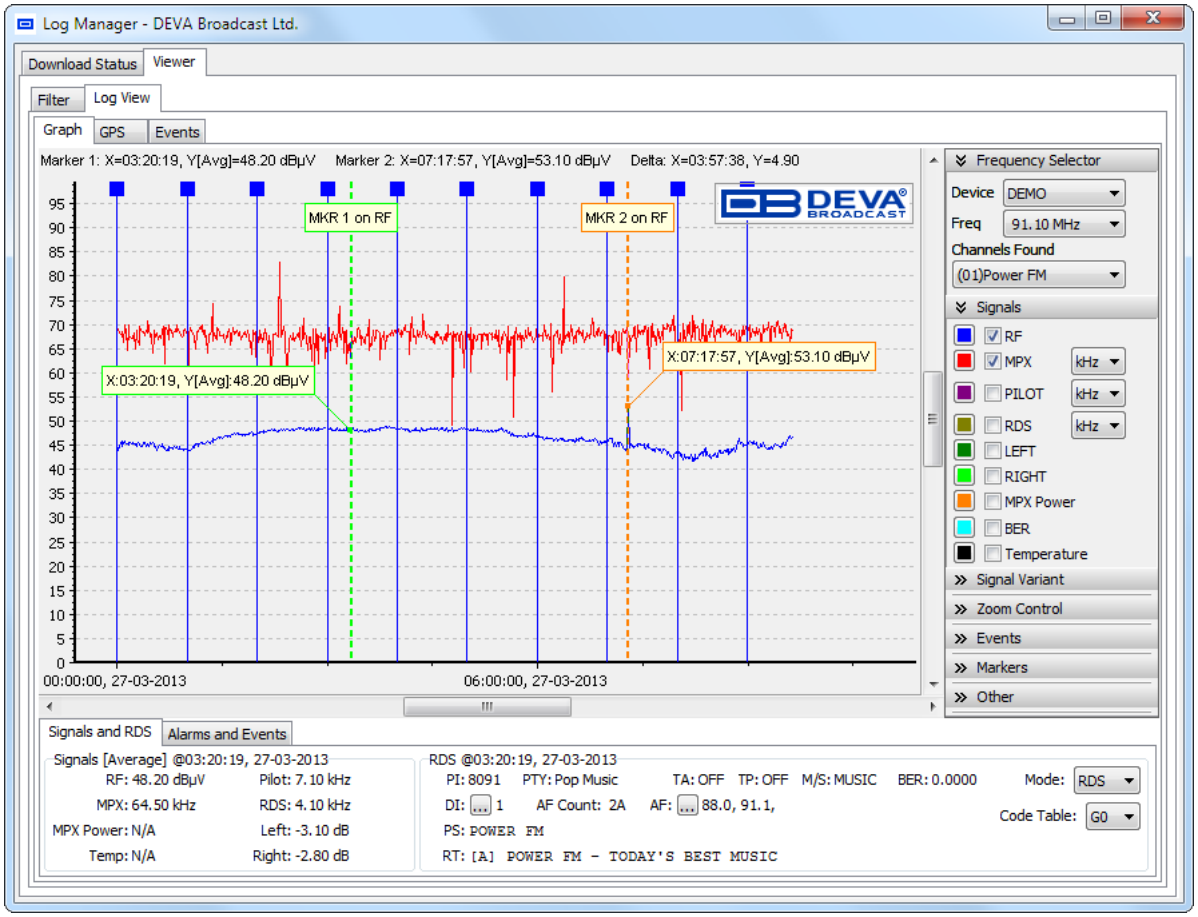
HAVE IN MIND: When a particular day is chosen, the Log Manager will automatically offer to visualize the information within the whole day (i.e. as if the Preview All button is selected).

NOTE: In accordance with the particular Log files and the device from which they were generated, the visualization will be performed in the following sections:

- For DB4004 - in section Graph;
- For Radio Explorer II - in section GPS.

Export All – The listed Log Files will be exported to user-defined directory and saved.

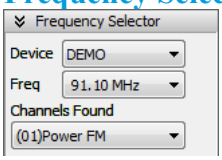
VIEWER - LOG VIEW - GRAPH



The information about the measured signals from the selected logs is visualized as a graph situated within the X axis. The Y axis is infinite - the units depend on the specific signal.

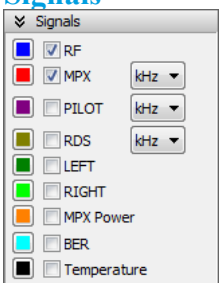
Right-side options / selectors

Frequency Selector



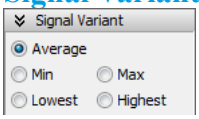
Device – the device from which the log files originate;
Freq – specify the frequency to be visualized;
Channels found – the name(s) of the available channels for the selected frequency are listed.

Signals



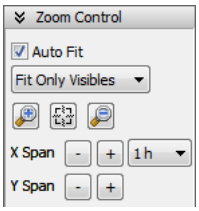
The color representation, units and signal(s) to be visualized are defined through this menu.

Signal Variant



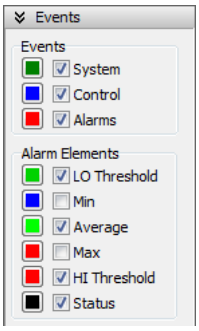
- Average, Min and Max – represent the measured values;
- Lowest and Highest – represent the thresholds of the signal.

Zoom Control



The Graph could be fitted automatically via “Auto Fit”, options – Fit All or Fit visible only. Using the relevant buttons the graph could be zoomed in/out or centered. The X and Y span could also be managed in accordance with your requirements.

Events



The events to be displayed and their color representation on the Graph are defined trough this menu.

The System and Control events are visualized as “flags” and placed at the bottom of the graph (on Y axis) because they are not specific for any signal and represent the common events related to that moment.

The RDS/RBDS Group Alarms are also represented as flags, placed above the one used for System and Control and are with the same color as the one selected for the RDS signal.

Flag up – indicates that there is a GROUP OK event.

Flag turned down – indicates that there is a GROUP LOSS event.

The alarm events consist of multiple components, which may also be visible/invisible and colored as required. The alarm elements placed on the Y axis are as follows:

- HI Threshold - indicated as a triangle with the apex pointing down;
- LOW Threshold – indicated as a triangle with the apex pointing up;
- Min, Average, Max – indicated as rectangles;
- Status – indicated as text presenting the current condition (HI MPX).

Markers

By choosing the relevant check box, the markers can be visible or not and adhere to a signal. Marker 1 and Marker 2 are used for receiving of detailed information about the signal under them.

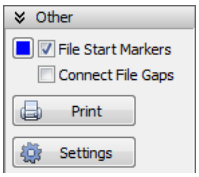
NOTE: If the signal (which is hooked to the marker) is not visible, then the marker will not show any information.

Marker 1 Follows Mouse – By applying this function, Marker 1 will follow the movement of the mouse cursor, without the need to drag the Marker in order for the measurements to be visualized. Unlike Marker 1, Marker 2 does not depend on this option and is controlled by dragging.

Show Marker Balloons – displays information about the specific signal directly at the intersection point with the marker. If the option is disabled, the balloon will not appear, but the information will be visible in the information bar above the graph.

Delta X, Y represents the absolute difference between Marker 1 and Marker 2 along the X and Y axis and will be visualized in the information bar, only when both markers are enabled.

Other



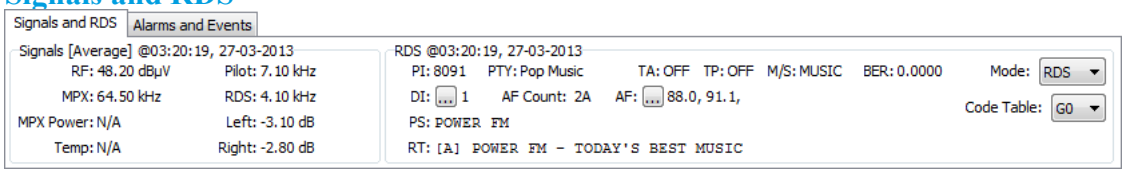
File Start Markers – The beginning of each log file is marked with a vertical line. When pointing with the mouse cursor on the square placed on the top of the File Start Markers the file name will be displayed.

Connect File Gaps – the gaps between the files will be linked. Generally, they are negligible and very difficult to detect with the unaided eye.

Print button – used for printing of the currently displayed on the graph measurements. For further information on the print capabilities refer to “Print Capabilities” on page 66.

Settings button – opens a tab with settings applied to all options from “Right-side options / selectors”.

Signals and RDS



The data from the current position of Marker 1 (MKR 1) is displayed in this section.

Signals – the values of all signals are displayed. The variation of the signal is indicated in the square brackets (see "Signal Variant" on page 26). The time slot of the visualized values is noted after the @ symbol.

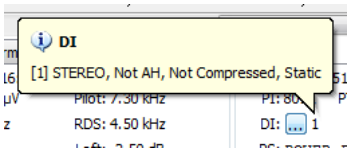
If a particular signal is within the predefined high or low threshold levels, the text will be marked in bold and colored in the relevant color, defined in section Alarm Elements (see "Events" on page 26)

RDS – All mandatory RDS/RBDS parameters are visualized here;

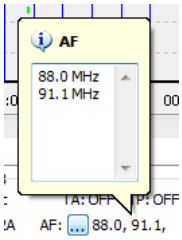
Mode – used for choosing of the RDS / RBDS local mode;

Code Table – used for choosing of the local table to be used for encoding of the PS and RT text information;

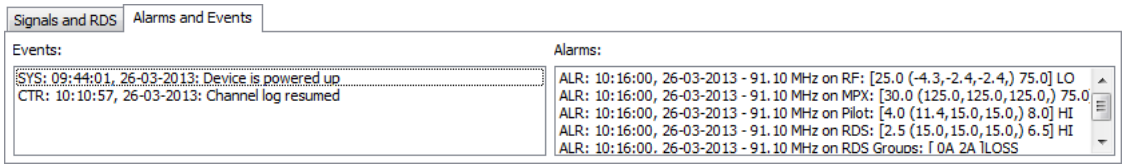
Button DI – a balloon containing a detailed interpretation of the numerical value of DI will be shown.



Button AF – a balloon containing a list of all Alternative frequencies will be shown.



Alarms and Events



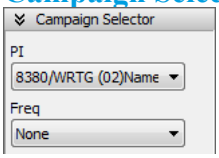
All events originated in the immediate proximity to MKR 1's position are listed here.

VIEWER - LOG VIEW - GPS

This section of the DEVA Device Manager is used for visualizing of the data from the log measurements of the signal, presented as a graphic, located on a map. The graph is formed by examining points which follow a certain sequence and forming the resultant “travel path”.

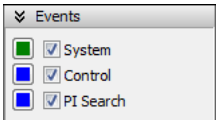
Right-side options/selectors

Campaign Selector



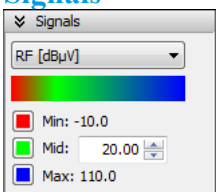
Used for selecting of a campaign to be visualized (from the existing ones). There are two types of campaigns to choose from – PI and Frequency. Except for the existing campaigns, the options All or Nothing could also be specified.

Events



Used for selecting of the events to be depicted on the map and their color representation.

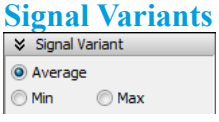
Signals



This selects the signal that will be depicted on the map. Each signal has a predefined minimum and maximum strength. Only the middle signal strength could be user-defined. The color representation for minimum, maximum and middle signal strength could be modified. Together the color representations of the signals form the so-called Color gradient.

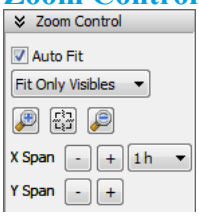
When a point of the signal is visualized, the color depends on its representation within the boundary of the gradient. Thus, only with a quick look at the map, the “hot” areas of the signal could be detected.

Signal Variants



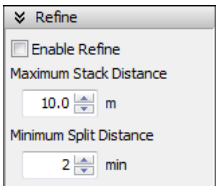
The variation of the signal to be displayed.

Zoom Control



The Graph could be fitted automatically via "Auto Fit", options – Fit All or Fit visible only. Using the relevant buttons, the graph could be zoomed in/out or centered. Also, map zooming and moving can be made with the left and middle mouse buttons.

Refine

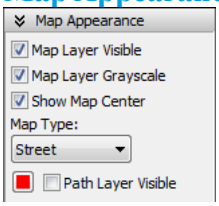


Additional options for reducing of the points and the formation of the signal path.

Minimum Stack Distance – If the distance between two points is less than the one that is set, these two points will be converted into one.

Minimum Split Distance – If the time between two points is greater than the one that is set, the covered distance between these two points is considered as unknown. The first point is regarded as the end of the present path and the second as a starting point of the next one.

Map Appearance



Map Layer Visible – The map could be turned off and the measurements visualized on a white background.

Map Layer Grayscale – will grayscale the map, allowing easy reading of the current condition and position of the visualized measurements.

Show Map Center – shows/hides the dotted lines used for indicating the map center.

Map Type – Used for customizing of the appearance of the map. The following options are available: Street, Terrain, Satellite.

Path Layer Visible – shows/hides the formed signal path.

Other

Settings button – opens a tab with settings applied to all options from "Right-side options/ selectors".

Point Selection

Since the graph is compound by linked together signal points, each point could be analyzed on an individual basis. In order for this to happen, the following steps should be completed:

1. Choose the part of the graph to be analyzed;
2. Zoom in the map so that the points could be clearly visible;
3. Using the mouse, select the point to be examined;
4. Once the point is selected the corresponding information will be displayed.

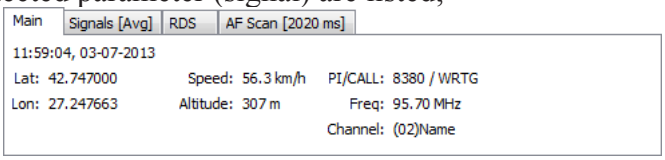
The available Information is interpreted on two levels:

A) On the map, as a balloon in the upper left corner - only the basic parameters for GPS location, frequency, PI / CALL and the value of the selected parameter (signal) are listed.

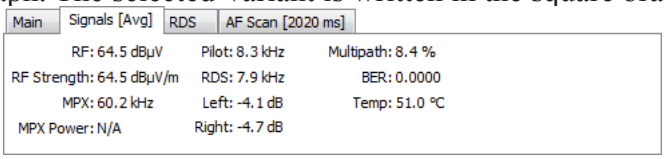
B) Underneath the map in the following sections:

- Marked Points – contains a list of the marked points. The currently selected point will be displayed;

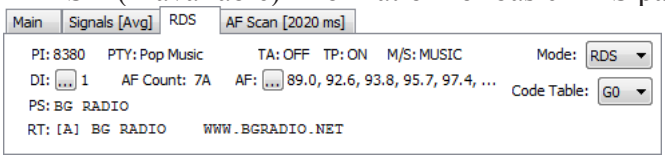
- Main – the basic parameters for GPS location, frequency, PI / CALL and the value of the selected parameter (signal) are listed;



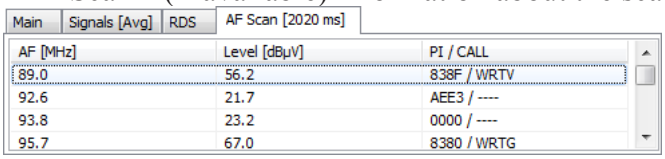
- Signal [Variant] – contains information about all available parameters at this point of the graph. The selected Variant is written in the square brackets;



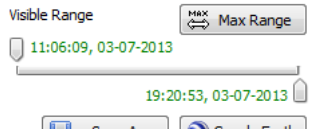
- RDS – (if available) information for basic RDS parameters (see “RDS” on page 28);



- AF Scan – (if available) information about the scanned Alternative Frequencies (AF).



C) Visible Range – This selector encompasses the time span of all points. Only the points between the selected start and end times are visualized.



Google Earth

DEVA Device Manager is a Google Earth compatible tool for visualization of the collected FM Radio Measurements. Once a campaign is finalized, the collected files could be converted into KMZ format (using the “Save as” button and then opened in Google Earth) or automatically visualized in Google Earth via the relevant button.

PLEASE NOTE that in order “Google Earth” button to be used, the Google Earth application should be installed on your computer.

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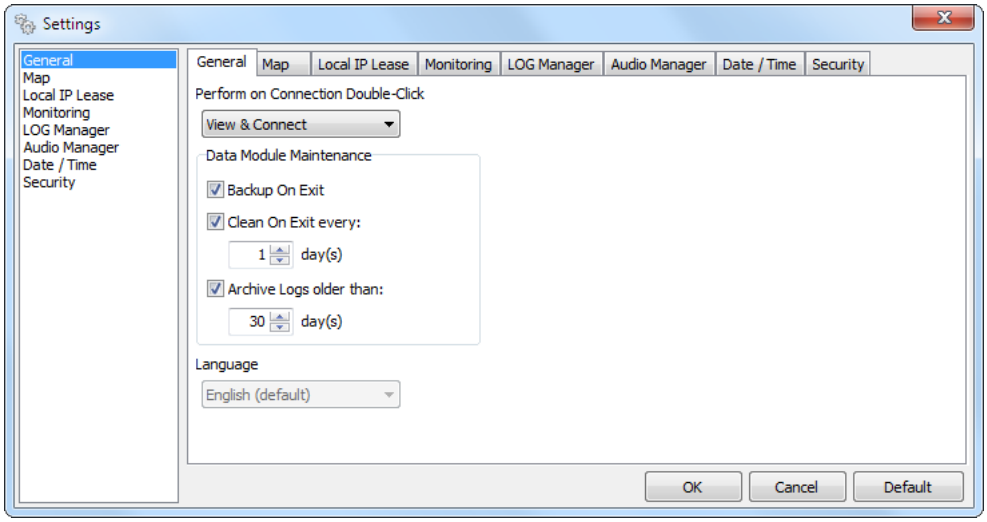
Main Application Settings

GENERAL

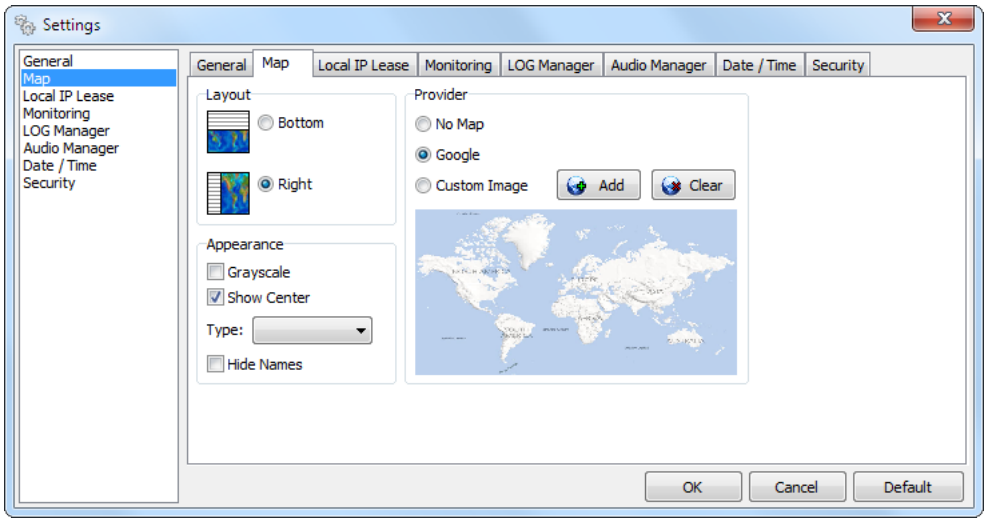


Perform on Connection Double-Click – The following options are available:

- View and Connect;
- Edit;
- View.

Data Module Maintenance – The general Maintenance settings are made trough this section. All parameters could be set according your preferences.

MAP



This section gives you the opportunity to alter the look of the Map section placed in the main application window.

Layout

– The Map could be situated on the bottom or Right part of the screen

Appearance

- Selecting the **Grayscale** option check box, will grayscale the map allowing easy monitoring of the current condition and position of the devices.

- **Show Map Center** – shows/hides the dotted lines used for indicating the map center.

- **Hide names** – The device's names could be made visible or not, by choosing the corresponding check box.

Type

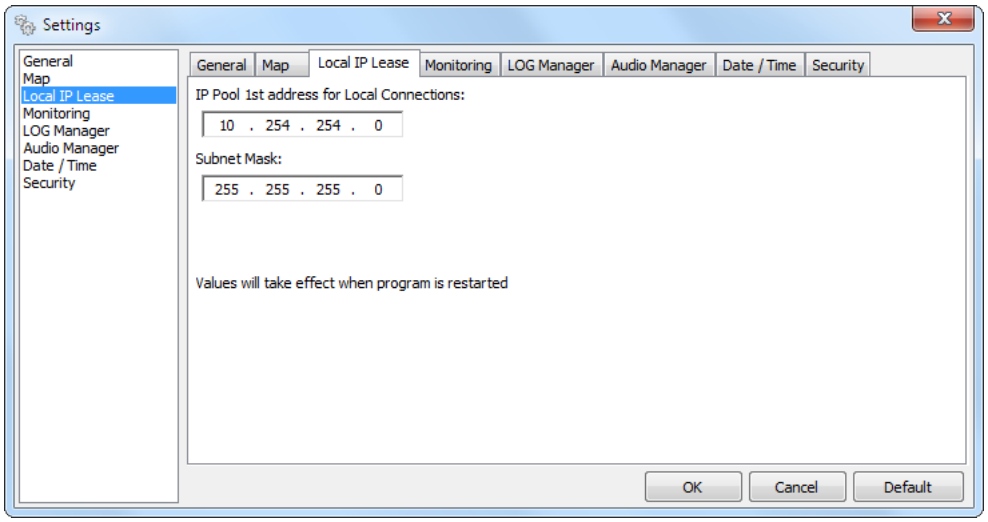
This option is available only when the chosen Provider is "Google Earth". Three types of Map visualization are utilized:

- Street map
- Terrain map
- Satellite map

Provider

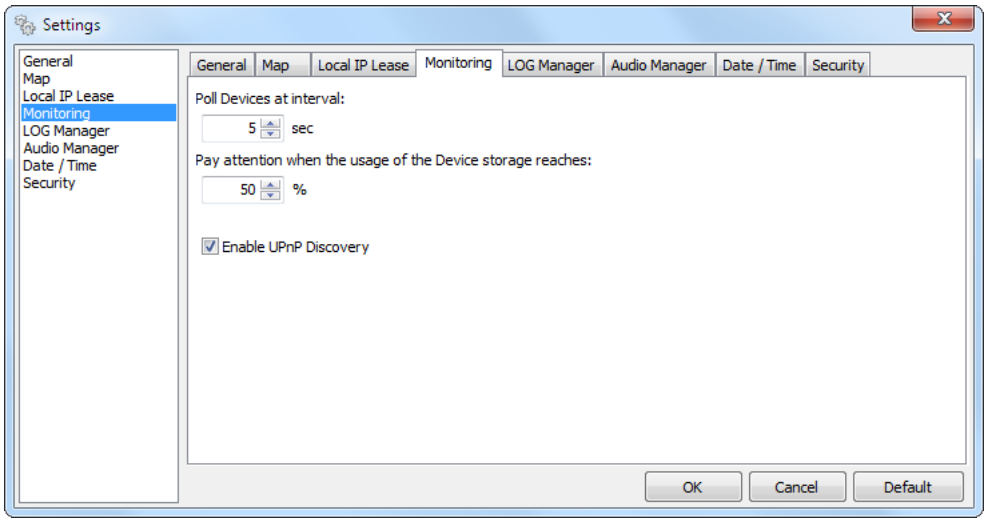
Depending on the requirements the map could be user-defined, Google Map or could not be used at all. Custom image may be added using the "Add" button – all types of images are supported. The currently employed user-defined map could be obliterated using the "Clear" button.

LOCAL IP LEASE



IP Poll 1st addresses for Local Connections and **Subnet Mask** are defined trough this section.
ATTENTION: In order for the values to take effect the program should be restarted.
NOTE: If you experience any difficulties contact your network administrator.

MONITORING

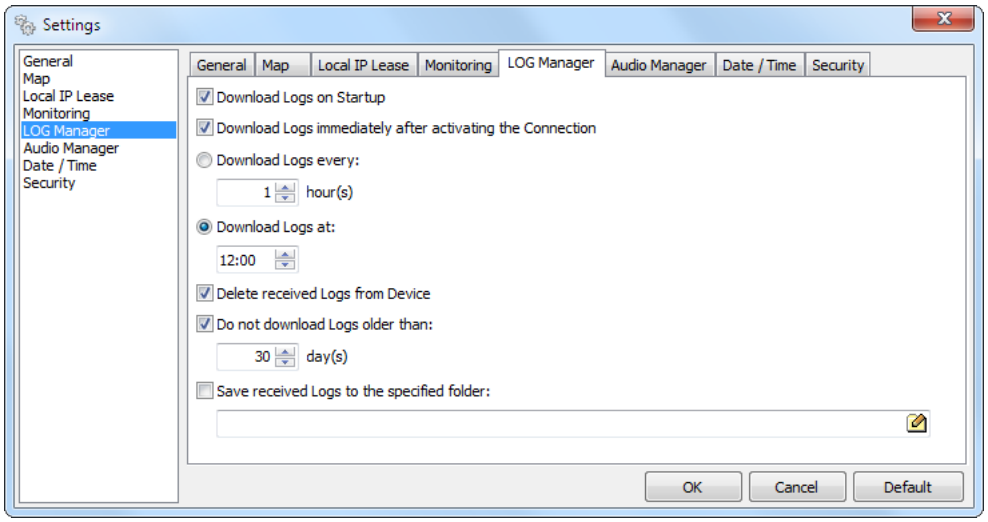


The managed network devices are polled periodically to synchronize the device status with the DEVA Device Manager. The Polling interval is set at 5 sec and can be changed by the user.

The **UPnP Discovery** feature is enabled by default but can be disabled by the user. When the UPnP function is enabled, DEVA Device Manager will find and add to the Local Connections List automatically all supported devices connected to the same network as your PC through USB or LAN. The device should be with activated UPnP in order to be discovered by the DEVA Device Manager.

When the **Device Storage** reaches 50%, the Software will make an automatic notification. This value could be modified by the user.

LOG MANAGER



DEVA Device Manager Software gives you the opportunity to choose among several conditions under which the downloading process can be started:

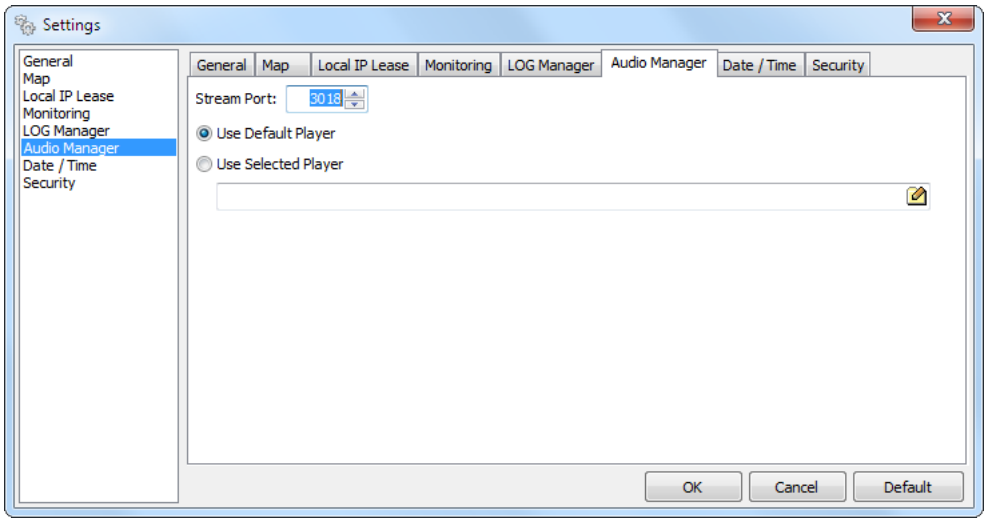
- Upon Startup;
- Immediately after activating a Connection;
- Downloading at predefined periods of time;
- Downloading at exact time of the day.

The downloaded files can be automatically deleted from the device by selecting “Delete received Logs from Device” option.

Using “Do not download Logs older than” option will guarantee you that Log files older than the preferred will not be downloaded.

Another great option is that the received Log files could be saved in a specified folder. In order to enable the function click on the corresponding check box and select the preferred folder by clicking on the corresponding button.

AUDIO MANAGER



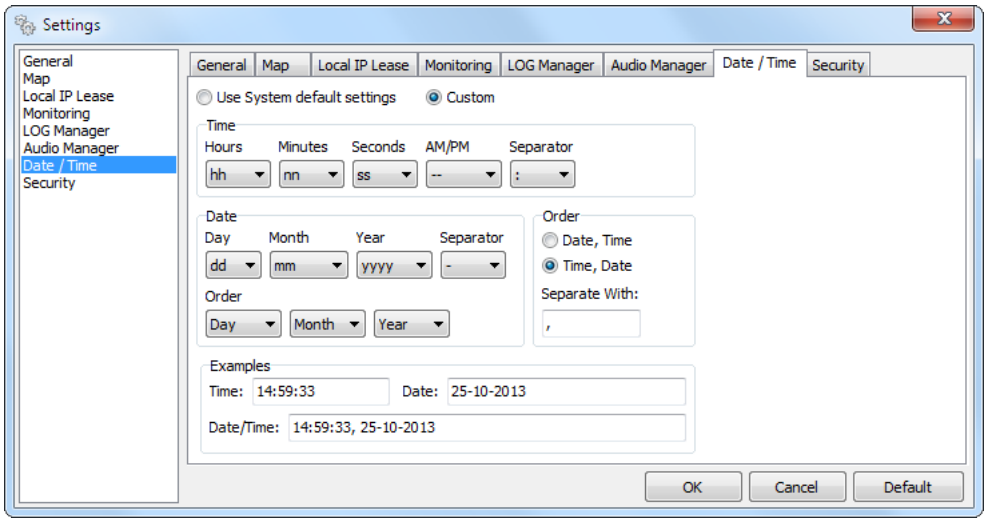
The Audio Manager is designated to handle the audio stream flow from the transmitting device and redirect it to a user-selected audio player (or the default player in Windows).

Stream Port – The port to be used in order for the audio stream to be redirected.

Use Default Player – System's assigned default player will be used.

Use Selected Player – In order for this function to be applied, the Player's source directory and executable should be specified.

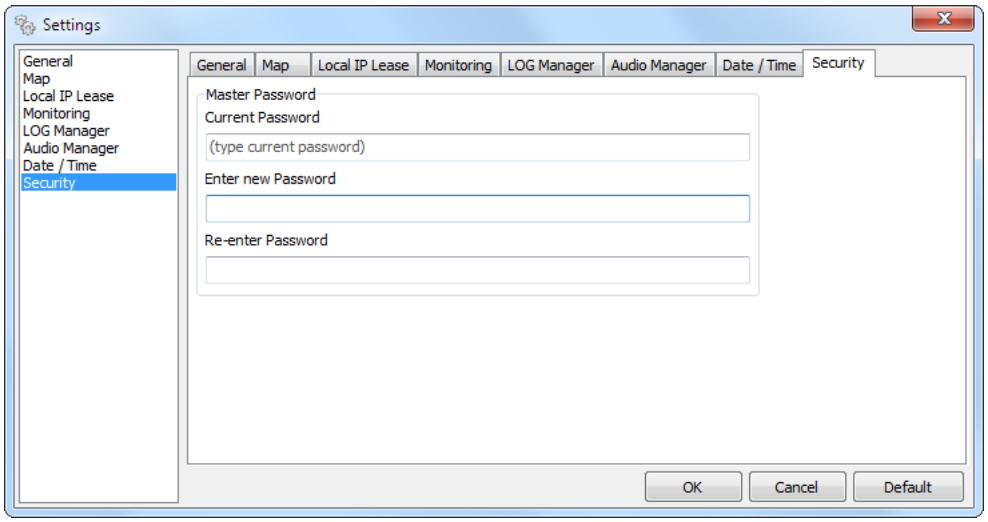
DATE/TIME



The system default settings could be used for displaying of the date and time or could be customized. DEVA Device Manager utilizes several types of visualization, depending on your requirements.

NOTE: These settings are not generally applicable. They are used only when it is appropriate.

SECURITY



The Master Password protects stored passwords used for an access to remote devices. If you share a computer with anyone, it is recommended that you use a master password.

If you have set a Master password upon DEVA Device Manager's first activation, this section could be used for changing of the password.

NOTE: Please make sure you remember the Master Password you have set. If due to any reason you forget your Master Password, contact us for detailed instructions on the reset procedure.

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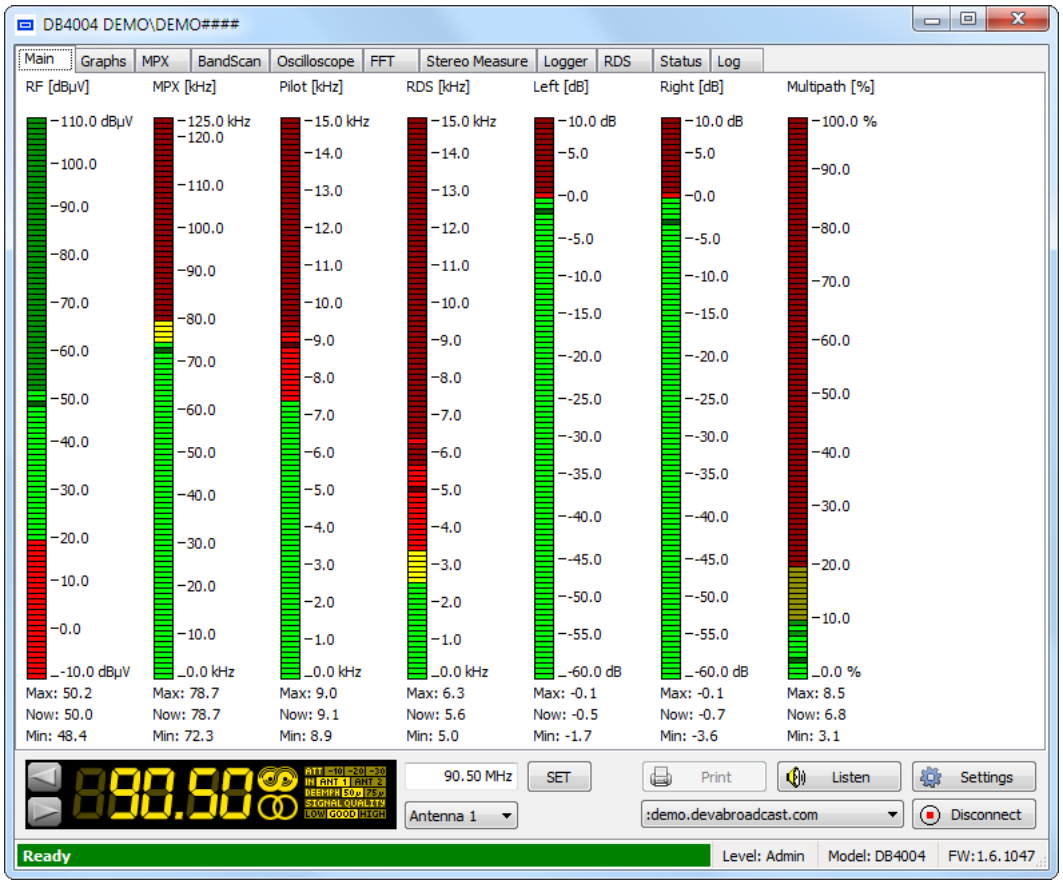
Device Control Window

MAIN SCREEN

The appearance of the Main Screen differs depending on the device's functions and is initial window for all controlled devices via DEVA Device Manager Software.

- DB4004 - DSP-based FM Radio Monitoring Receiver;
- DB7000 – FM Radio Re-Broadcast Receiver;
- Radio Explorer II – Mobile FM Radio Analyzer.



The Main Screen shows all mandatory parameters represented as LED readings. The visualized indicators are user defined and under each of them are shown three values for the period since the last frequency change:

Max – the maximum peak values;
Now – the current measured value;
Min – the minimum peak values.

NOTE: The content of this window differs depending on the chosen application, but the bottom section remains the same.

You can choose between two antenna inputs and easily select the preferred audio frequency by using the left and right arrow buttons placed on the left part of the screen.

Using the interactive left and right arrows you can choose the preferred station.

The frequency step is defined in the device's settings menu and can be changed via DEVA Device Manager.

NOTE: The frequency step can be set/changed via DEVA Device Manager only if you are logged in as an Administrator via the "Settings" button (see "Device Control Window Settings" on page 58).

SET – Once the preferred Frequency is written, the *SET* button should be pressed in order for the changes to take place.

Settings button is used for customizing of all applicable device and Control Window settings (see "Device Control Window Settings" on page 58).

Print – used for printing of the currently visualized information. Depending on the selected tab the function could be inactive (see "Print Capabilities" on page 66).

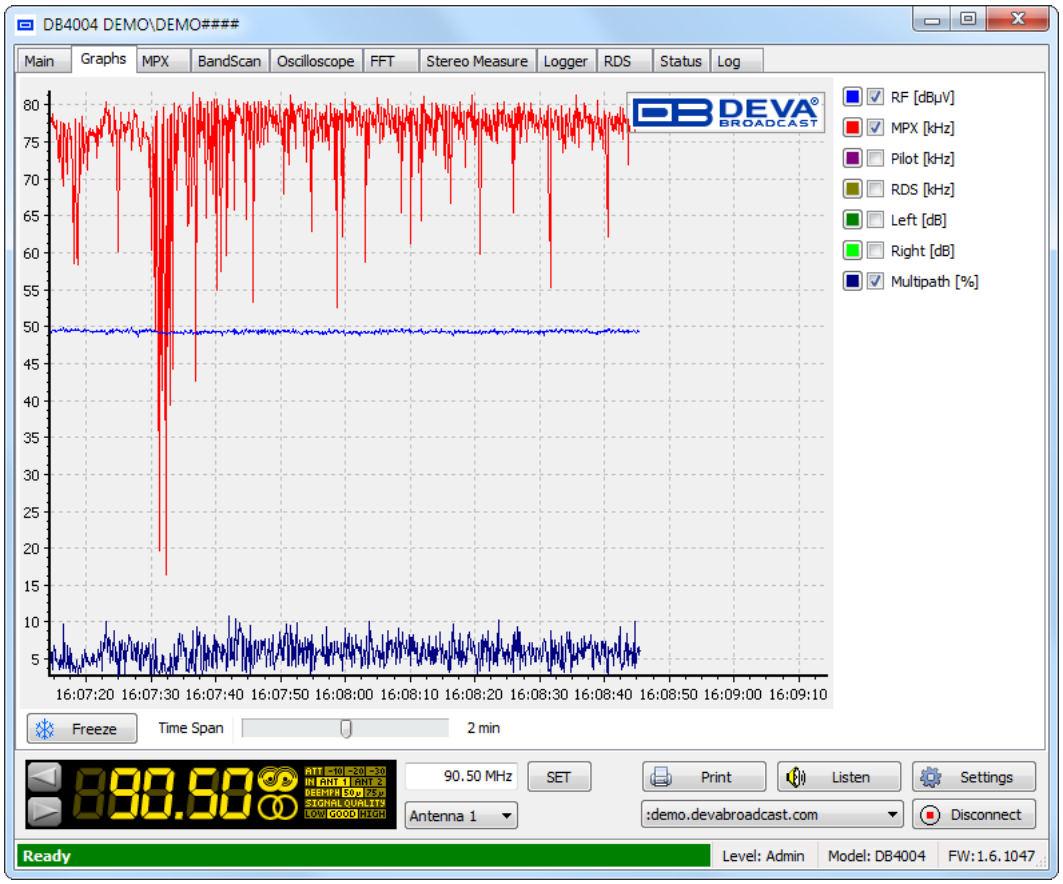
The **Listen** button provides the user with an easy and instant way to hear the currently selected station. When clicked, the Listen Button will open a player which will reproduce the received signal.

Connect/Disconnect button – used for connection with the device through the selected connection from the drop-down menu (placed in front of the button).

GRAPHS

This function is supported by:

- DB4004 - DSP-based FM Radio Monitoring Receiver;
- Radio Explorer II – Mobile FM Radio Analyzer.



This screen represents all mandatory parameters over the selected time span.

All parameters have own color representation and measurement units, visible besides the graph. Having in mind that visual perception differs from person to person the colors could be changed upon clicking on the square button, placed in front of parameter's name.

According to your needs the parameters listed on the right part of the dialog window, can be visible or hidden. Click on corresponding check-box in order for a parameter to be displayed. (see "Device Control Window Settings" on page 58)

Freeze is a button with double usage:

- Freeze – freezes all screen readings until UnFreeze button is applied;
- UnFreeze – unfreezes all screen readings.

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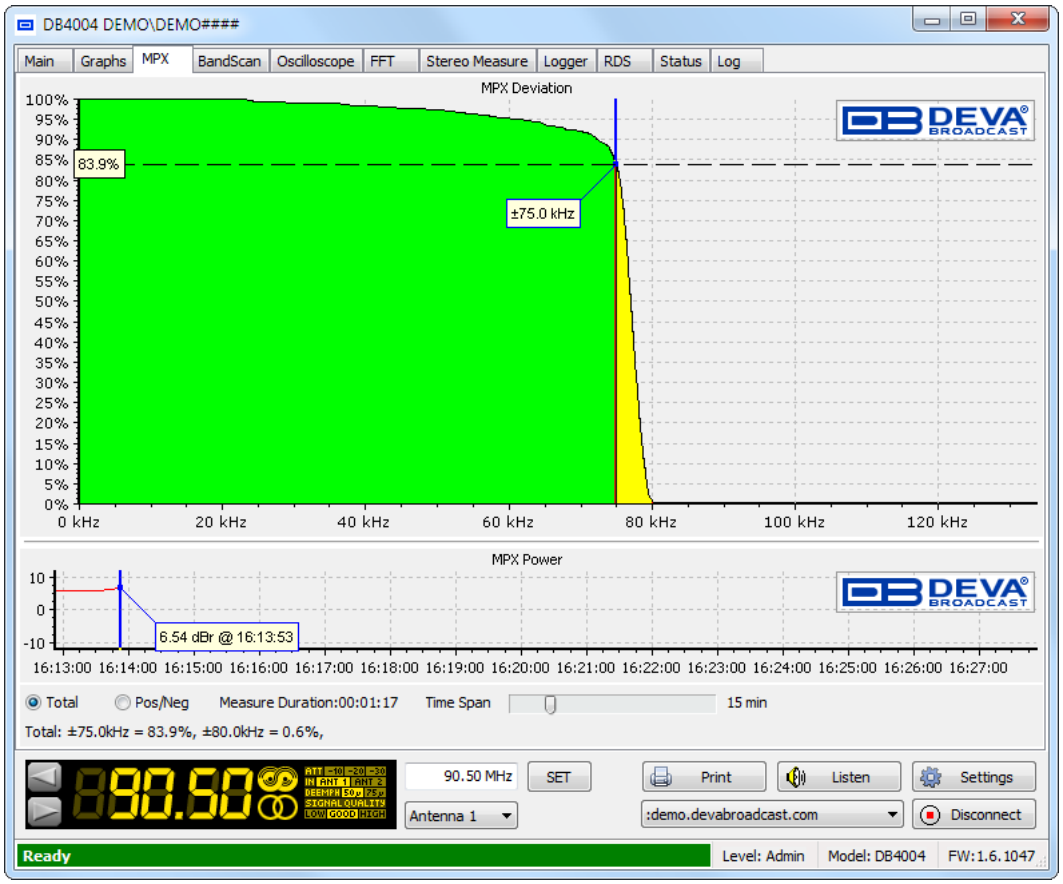
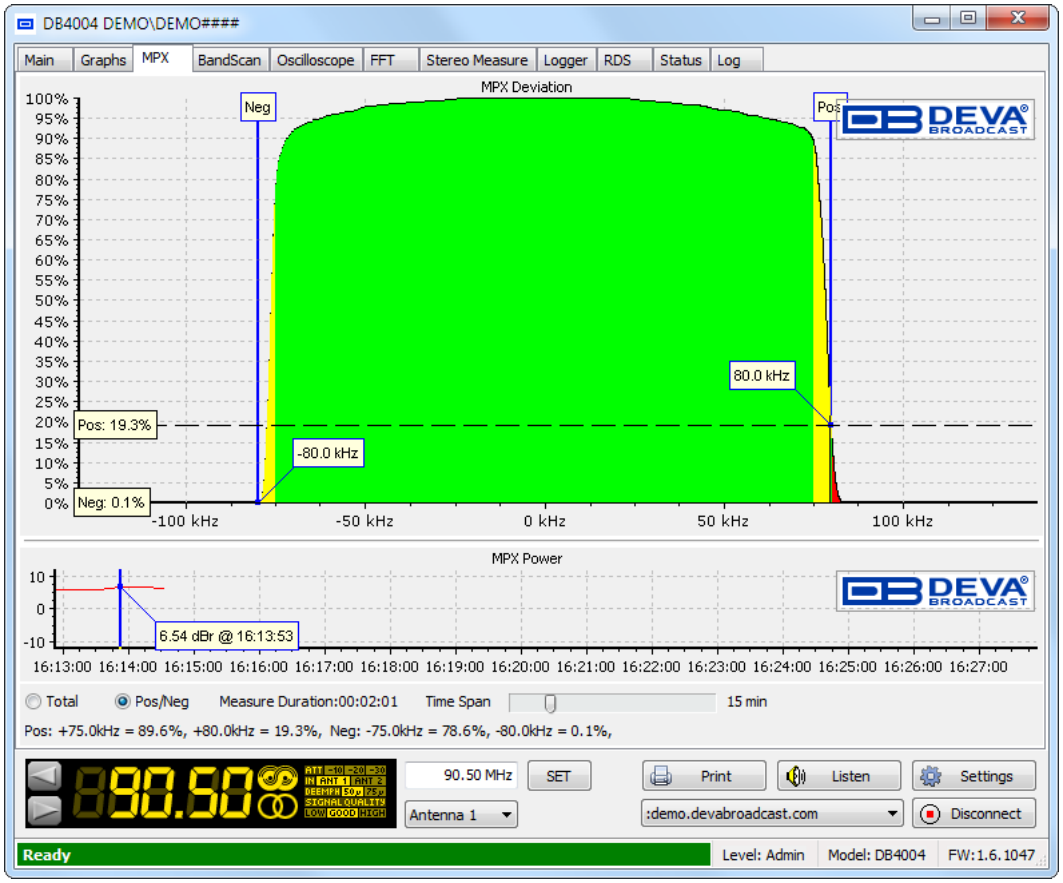
MPX

This function is supported by:

- DB4004 - DSP-based FM Radio Monitoring Receiver;
- Radio Explorer II – Mobile FM Radio Analyzer.



The graphic represents the MPX Deviation overshoot (in percent) over time. Standard overshoot is measured at 75 kHz and is indicated below the graphic. User-defined frequency can be selected by moving vertical marker along the horizontal scale. Overshoot will be indicated at the cross-point with the horizontal dotted line.



Another great feature is that depending on your current needs the MPX Deviation graph could easily visualize the Total or Pos/Neg Deviation by selecting one of the options.

MPX Power graph - The modulation power is a relative power of the MPX signal averaged over 60 seconds. 0 dBr corresponds to an average power of a signal equivalent to the power of a sinusoidal tone which causes a peak deviation of 19 kHz. Intensive audio dynamics compression as well as increasing overall peak deviation causes the modulation power to rise.

The Time span of MPX Power graph could also be customized via the relevant slider control.

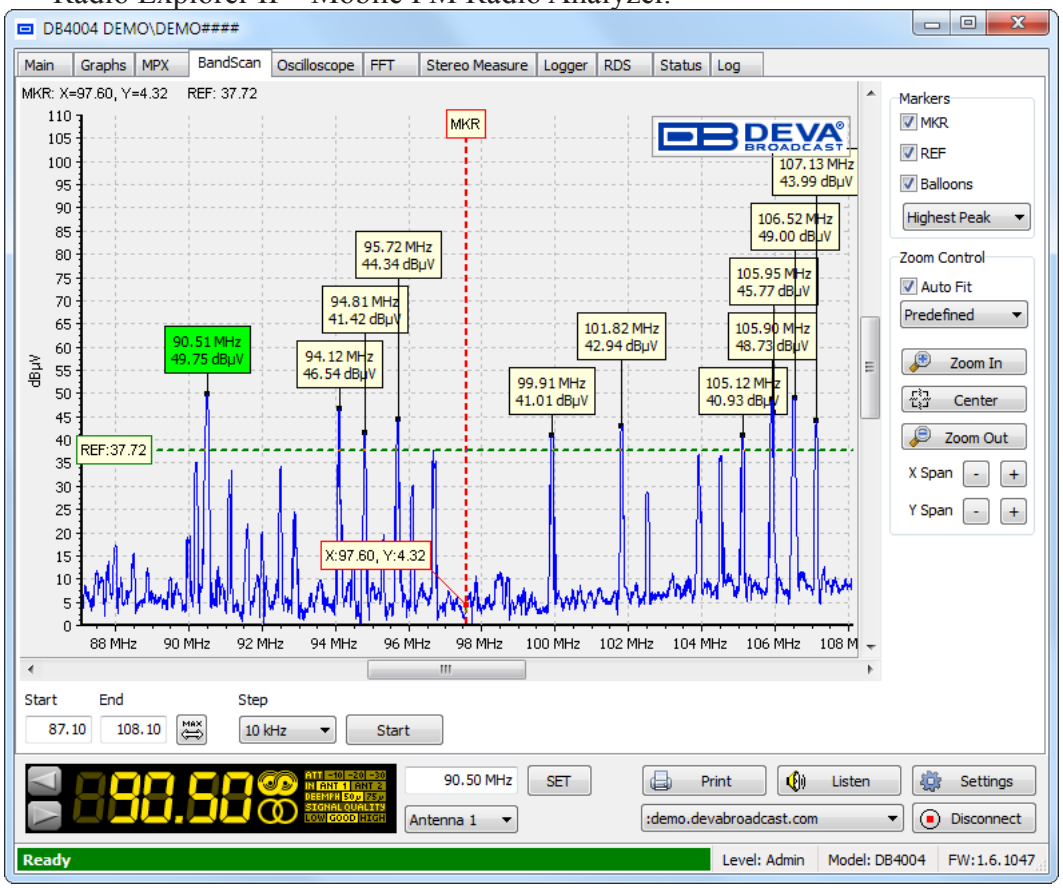
Information about the Measure duration, Positive and Negative Deviation is constantly written (and changing) on the bottom of the tab.

NOTE: The overshoot thresholds could be managed through the Settings menu. (see “Device Control Window Settings” on page 58)

BANDSCAN

This function is supported by:

- DB4004 - DSP-based FM Radio Monitoring Receiver;
- DB7000 – FM Radio Re-Broadcast Receiver;
- Radio Explorer II – Mobile FM Radio Analyzer.



The BandScan application utilizes several types of BandScan, depending on the preferred frequency step. The bandscanning range could be customized by setting the start and end frequency of the scan. Once you have set the frequency step and start/end frequency, the start button should be pressed in order for the BandScan process to be initiated.

A toolbar facilitating the usage of the BandScan mode and enabling its customizing is situated on the right part of the screen and contains the following sections:

Section “Markers” enables or disables the used auxiliary markers. Moving the Marker (MKR) along the Band Spectrum will display the level of the frequency under the marker. The Reference level (REF) defines the bottom of the analyzed zone.

As the result of the changed Reference level, peak balloons containing information about the peak will be displayed. The data is constantly updated according to the position of the REF marker.

The balloons could be visible or not by enabling/disabling the relevant function in the section. The user can choose between several types of peak find methods:

- Highest peak – The highest peak within the defined zone will be visualized;
- All peaks – all peaks within the defined zone will be visualized;
- Every 100 kHz – Nevertheless of the selected Reference level, the peaks will be visualized at every 100 kHz.

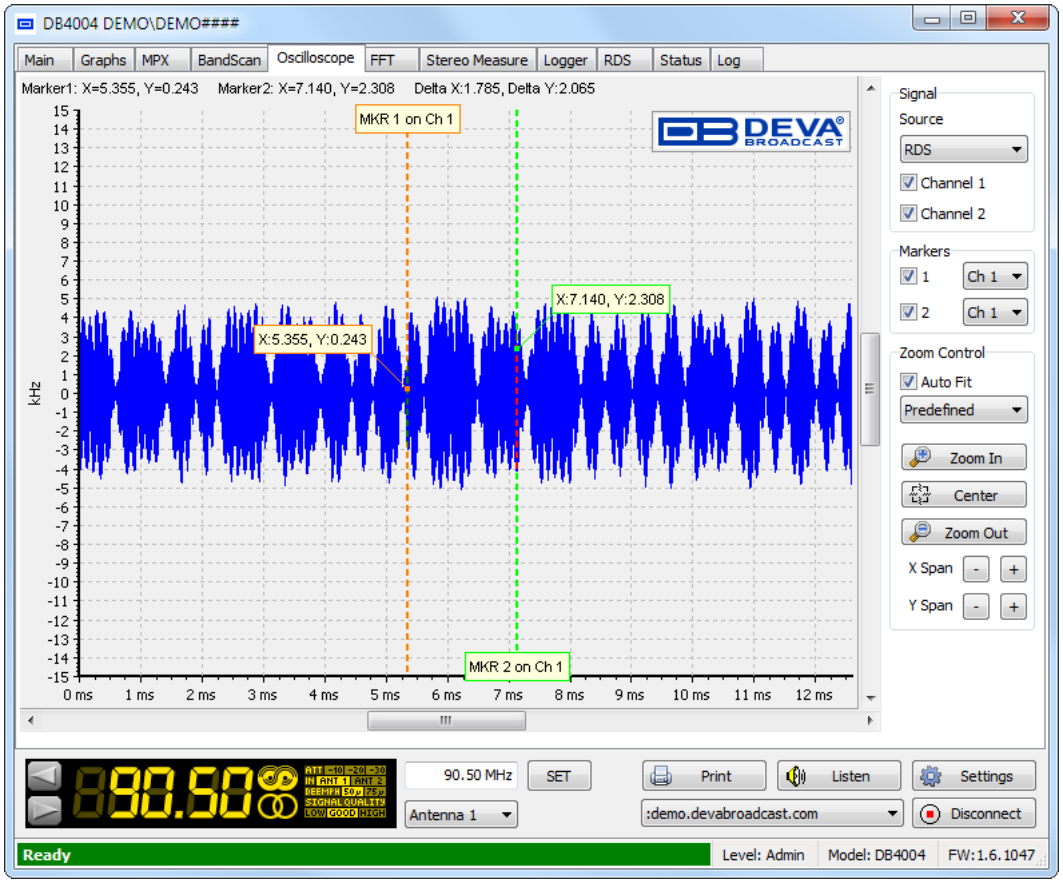
NOTE: Information for the current Markers (chosen reference level, frequency and corresponding level) can be found in the upper left corner above the diagram.

Section “Zoom Control” – The Graph could be fitted automatically via “Auto Fit”. You can choose between two modes of visualizing – Predefined and Extremes. Using the relevant buttons the BandScan Graph could be zoomed in/out or centered. The X and Y span could also be managed in accordance with your requirements.

OSCILLOSCOPE

This function is supported by:

- DB4004 - DSP-based FM Radio Monitoring Receiver;



Oscilloscope mode is used to visualize the most important signals participating in the process of demodulating and stereo decoding. This mode represents the observed signal change over time. A toolbar enabling customizing of the Oscilloscope function is situated on the right part of the screen.

"Signal" section – The signal source to be visualized is selected through the drop down menu. The monitoring channels is also set trough this section.

"Markers" section enables or disables the used auxiliary markers and changes their measurement pertain.

"Zoom Control" section – refer to "Zoom Control" on page 46.

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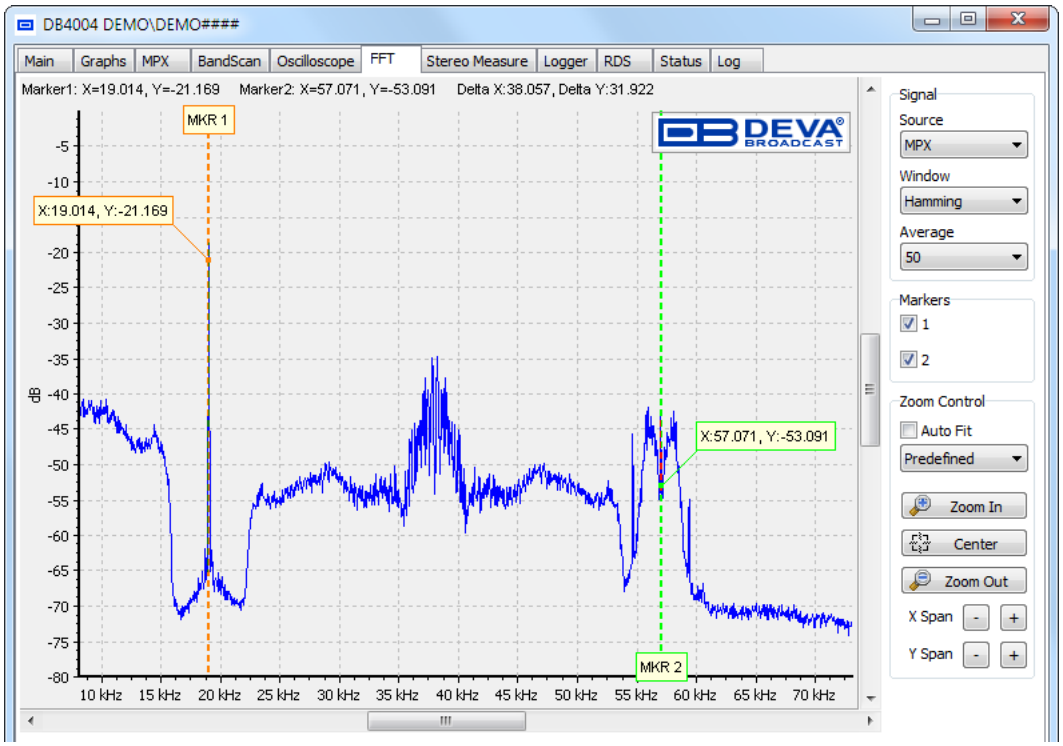
FFT (FAST FOURIER TRANSFORM)

This function is supported by:

• DB4004 - DSP-based FM Radio Monitoring Receiver;



The Fast Fourier Transform (FFT) is the Fourier Transform of a block of time data samples. It represents the frequency decomposition of the time signal. The signal source to be calculated and visualized is chosen from the Signal section placed on the right part of the screen.

The FFT based measurements are subject to errors from an effect known as spectral leakage, which occurs when the FFT is computed from of uninterrupted data block. This problem could be minimized by applying the appropriate windowing function. Depending on the specific application, the appropriate window function should be applied. Errors may be introduced in the FFT amplitude, frequency or overall shape of the spectrum if the windowing is not correctly applied.

The window function can be managed through the relevant drop-down menu. The available windows and their features are given below. This table can be used to choose the best windowing function for each application.

Window	Best type for these Signal Types	Frequency Resolution	Spectral Leakage	Amplitude Accuracy
Rectangle	Transient & Synchronous Sampling	Best	Poor	Poor
Barlett	Random	Good	Fair	Fair
Blackman	Random or mixed	Poor	Best	Good
Hamming	Random	Good	Fair	Fair
Von Hann	Random	Good	Good	Fair
Flat-top	Sinusoids	Poor	Good	Best

“Average” – the sound filtering step is defined from here.

“Markers” section – enable/disable the Markers.

“Zoom Control” section – refer to “Zoom Control” on page 46.

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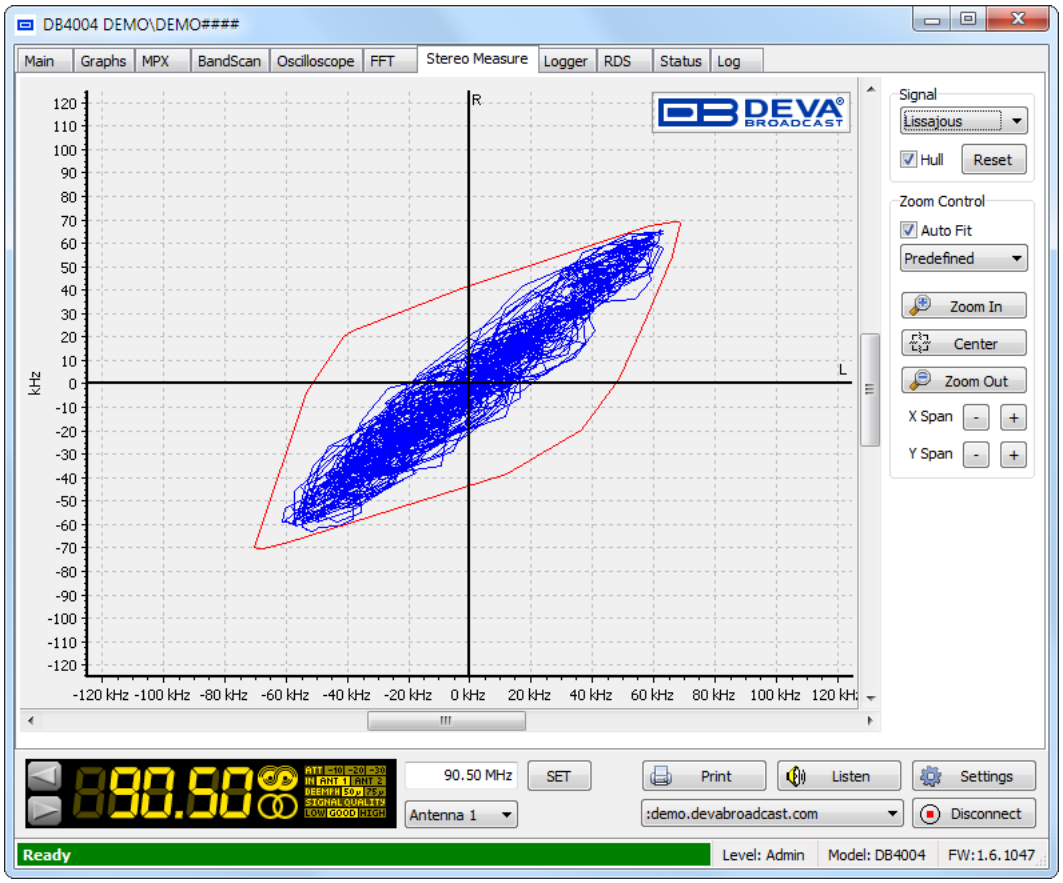
STEREO MEASURE

This function is supported by:

- DB4004 - DSP-based FM Radio Monitoring Receiver;



The graphical representation of the phase relations between Left and Right audio channels is illustrated above. This graphic is used to assess mono compatibility of the audio material as well as visualizing the stereo image or balance of the material. Experienced users of this type of display can easily detect the differences between mono signals, “pan-pot” stereo and true stereo signals. The audio levels for both left and right channels are given in kHz.

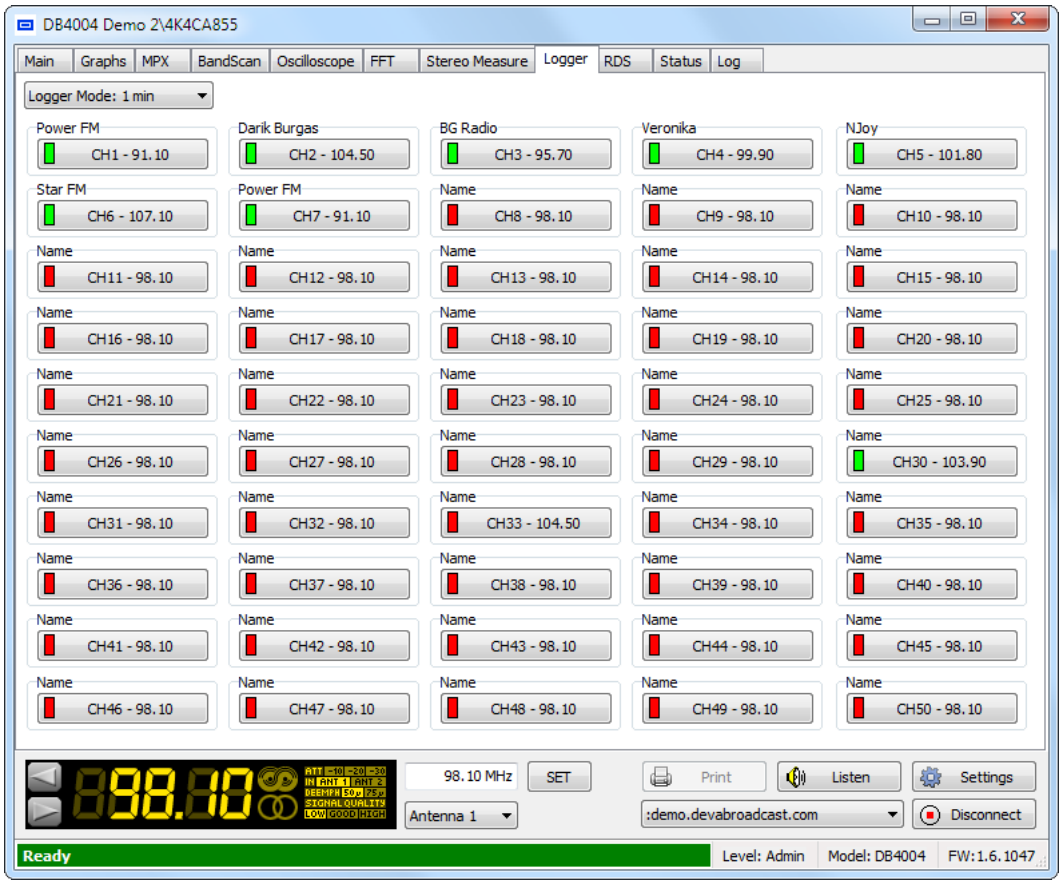
The Stereo measure signal visualization can be changed according the visual perception of the user. Using the drop down menu placed on the right part of the screen Cloud, Lissajous or Star – shaped visualization could be chosen.

The hull could be enabled or disabled by selecting (or not) the relevant check box. The Hull cloud traces the peaks reached by the L and R signals. The signals are constantly changing thus the Hull also changes. Visually the Hull expands like a balloon until one point at which it almost stops changing (usually when the highest signal is reached). The Reset button will delete the maximum values and the integration process will begin again.

LOGGER

This function is supported by:

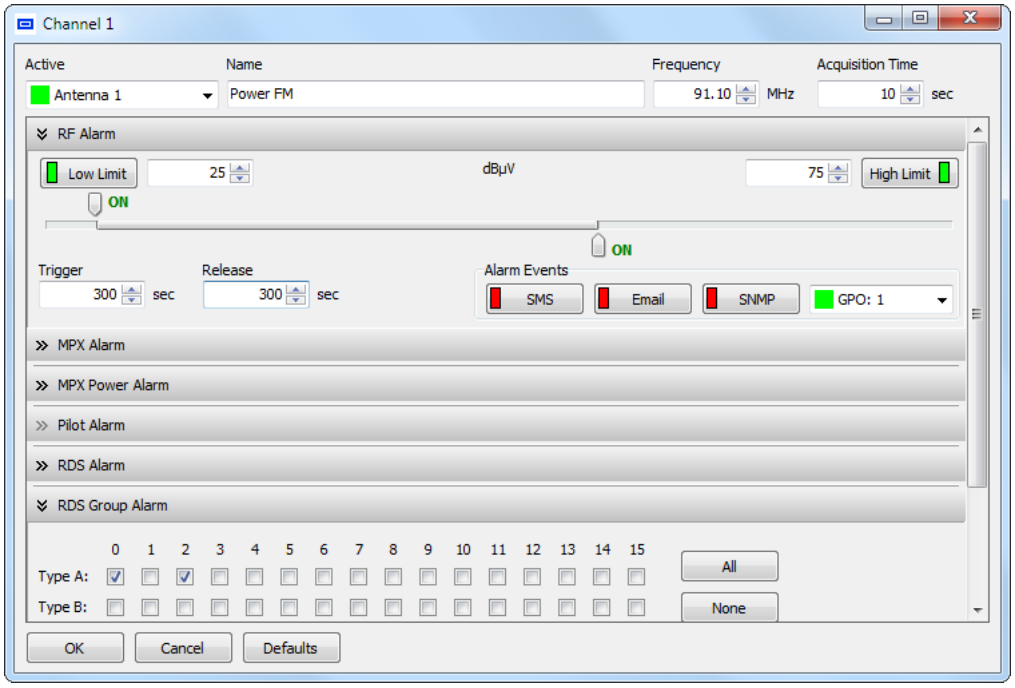
- DB4004 - DSP-based FM Radio Monitoring Receiver;
- Radio Explorer II – Mobile FM Radio Analyzer.



Trough this section, up to fifty audio channels could be chosen and monitored, by applying the needed settings. When the desired adjustments are made, all selected frequencies will be monitored at regular intervals. All of the collected information is accessible through the built-in FTP Server of the device.

Follow the steps below to initiate the simplified process of starting a Logger mode:

- Set the Logger mode time;
- Click on one of the empty channels to set Name, Frequency parameters and acquisition time for each of the channels;



• In order for a channel to be included in the campaign, “Antenna 1” or “Antenna 2” should be selected from the “Active” drop-down menu. To exclude a station from the campaign select the “Disable” option;

• Next Low and High limit Trigger and Release time and the preferred alarm notification could be set for the RF, MPX, PILOT, RDS, Left and Right alarms.

ATTENTION: Since Radio Explorer II does not support alarm notifications, thus all relevant settings are unavailable.

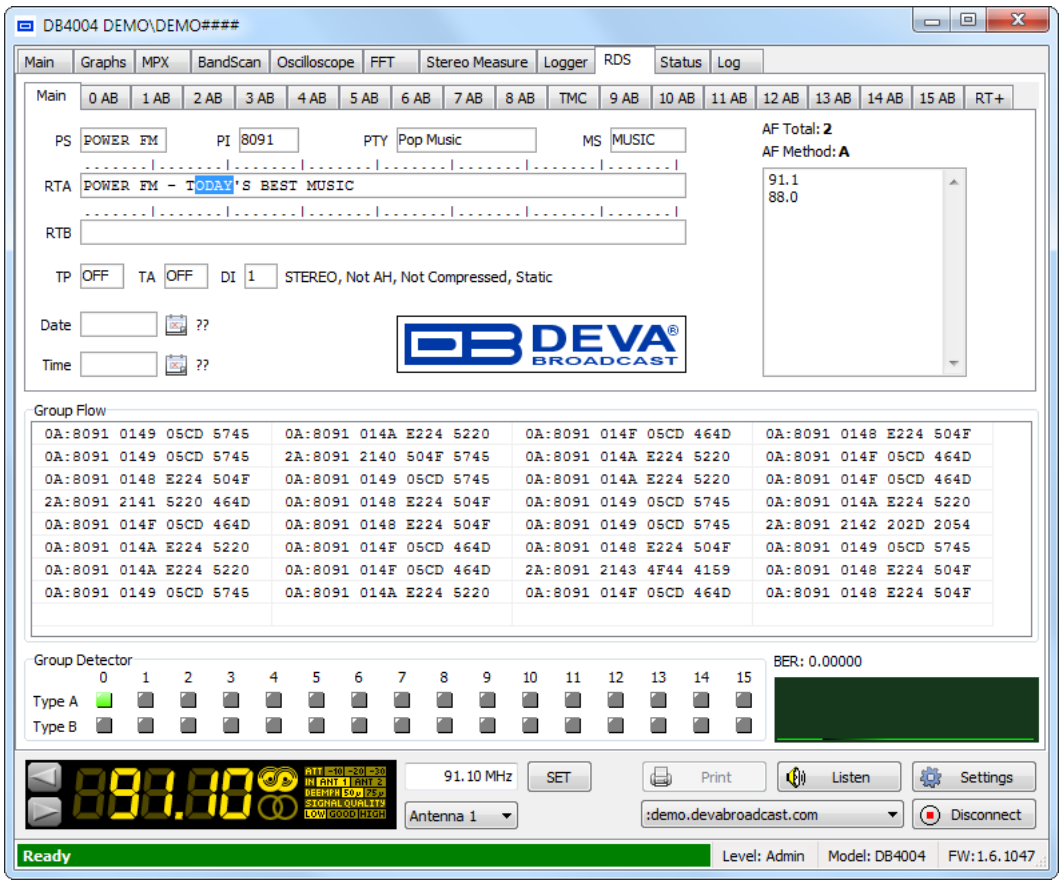
NOTE: When an option is enabled the green indicator placed in front of it will be green.

Upon completion, in order for the applied settings to take place, click on the “OK” button. If not click on “Cancel” or “Default”. The “Default” button could be used at any time of the work process if the Signal parameters should be reset to its factory defaults.

RDS

This function is supported by:

- DB4004 - DSP-based FM Radio Monitoring Receiver;
- DB7000 – FM Radio Re-Broadcast Receiver;
- Radio Explorer II – Mobile FM Radio Analyzer.



All main RDS features as PS, Radio Texts, PI, PTY, MS, TP, TA, DI and Alternative Frequency are visualized in the "Main" section of the RDS tab. For further information on all analyzed RDS groups refer to "APPENDIX B.2".

Group Flow – the sequence of the received RDS groups is represented here as a list, allowing easy monitoring of the received groups.

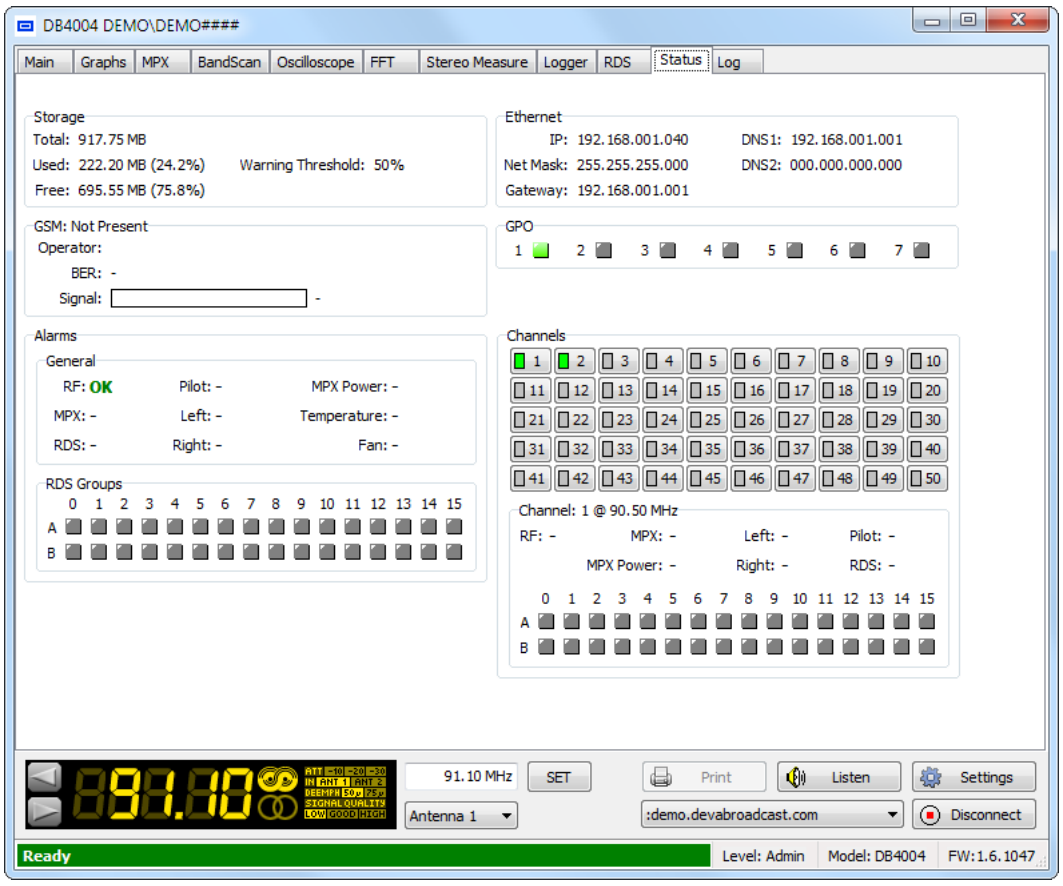
Intended to observe the channel quality a BER Indicator with graphics, showing the history of the BER quantities, is placed on the right bottom part of the screen.

Group detector - this function is used for reading of existing groups and is located on the bottom part of the screen. The corresponding LED illuminates in green when group presence is detected. This feature grants the user access to information about the transmitted groups and their appropriate frequency. In case more information is required, it can be found in the tabs where all information about the selected group is analyzed.

STATUS

This function is supported by:

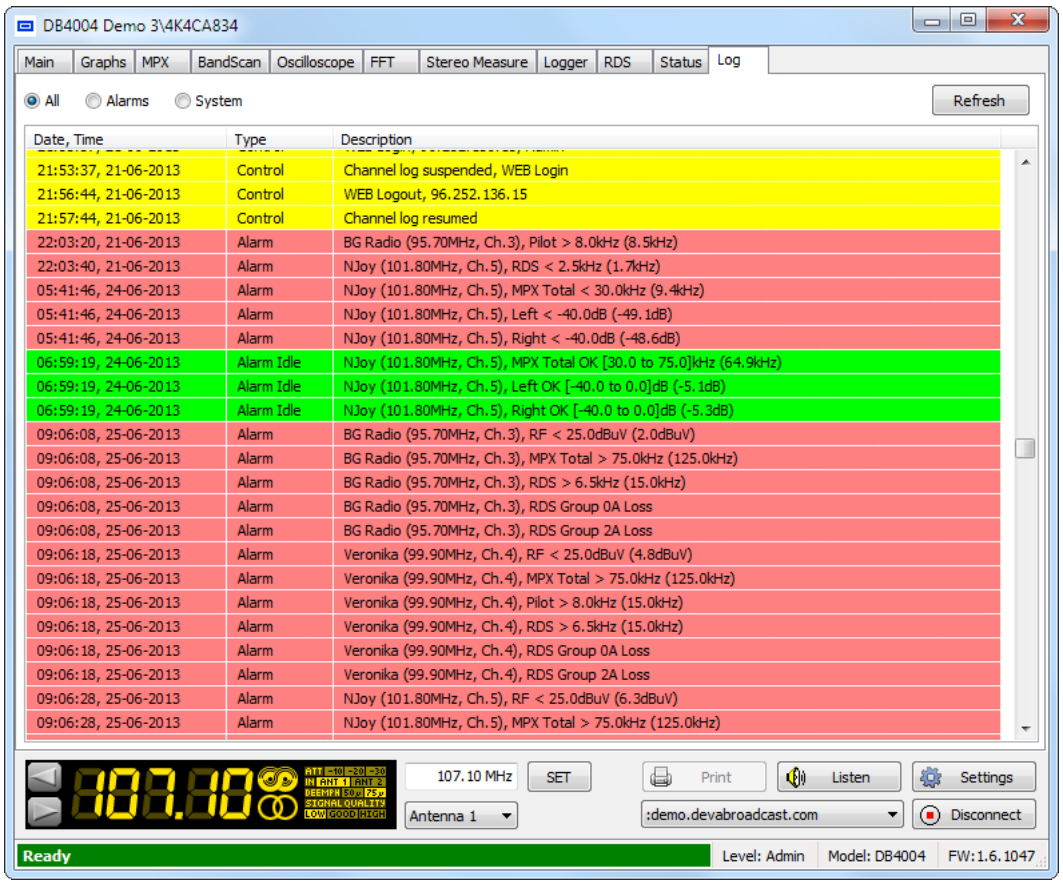
- DB4004 - DSP-based FM Radio Monitoring Receiver;
- DB7000 – FM Radio Re-Broadcast Receiver;
- Radio Explorer II – Mobile FM Radio Analyzer.



This tab contains information about the current status of the connected device and might be contextually different. The contained information is being updated constantly.

LOG

This function is supported by:
- DB4004 - DSP-based FM Radio Monitoring Receiver;
- DB7000 – FM Radio Re-Broadcast Receiver;
- Radio Explorer II – Mobile FM Radio Analyzer.

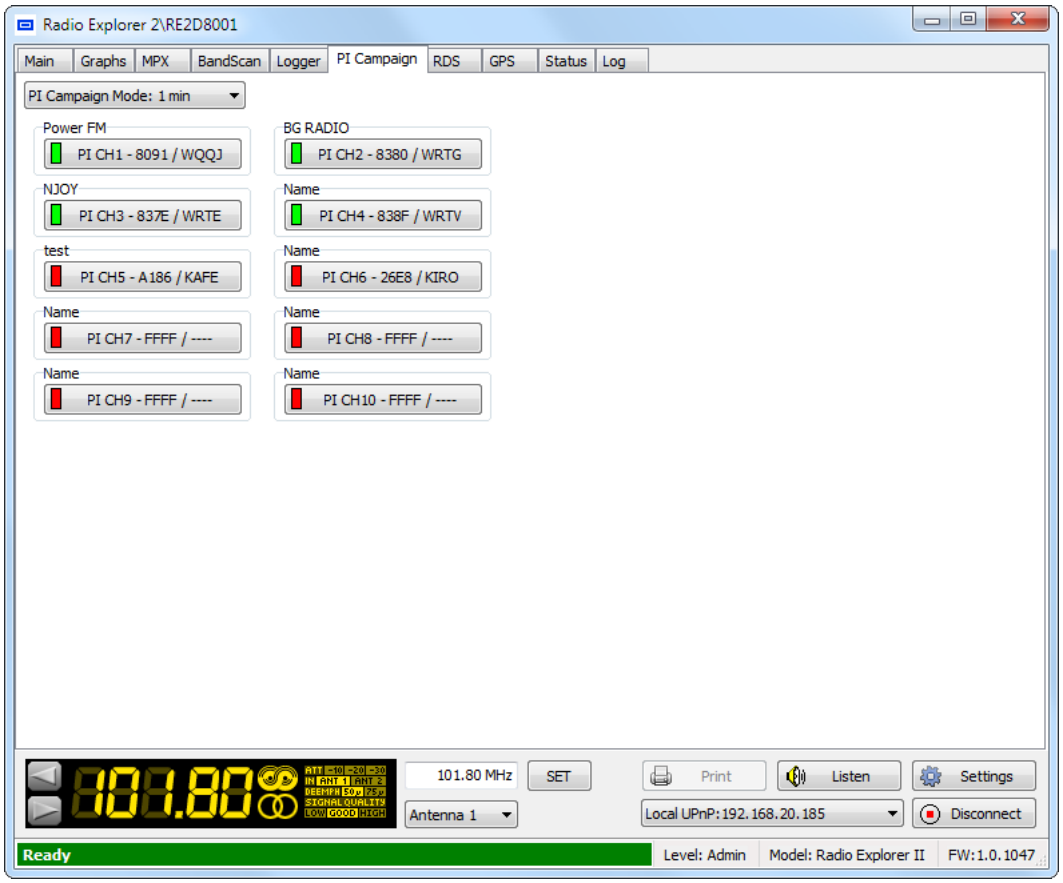


Here are listed all Device System Events, as well as the Alarms generated.

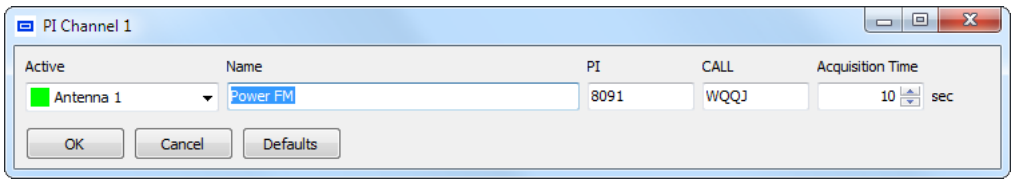
PI CAMPAIGN

This function is supported by:

- Radio Explorer II – Mobile FM Radio Analyzer.



Up to ten stations could be monitored simultaneously. Follow the steps below to initiate the simplified process of starting a campaign:



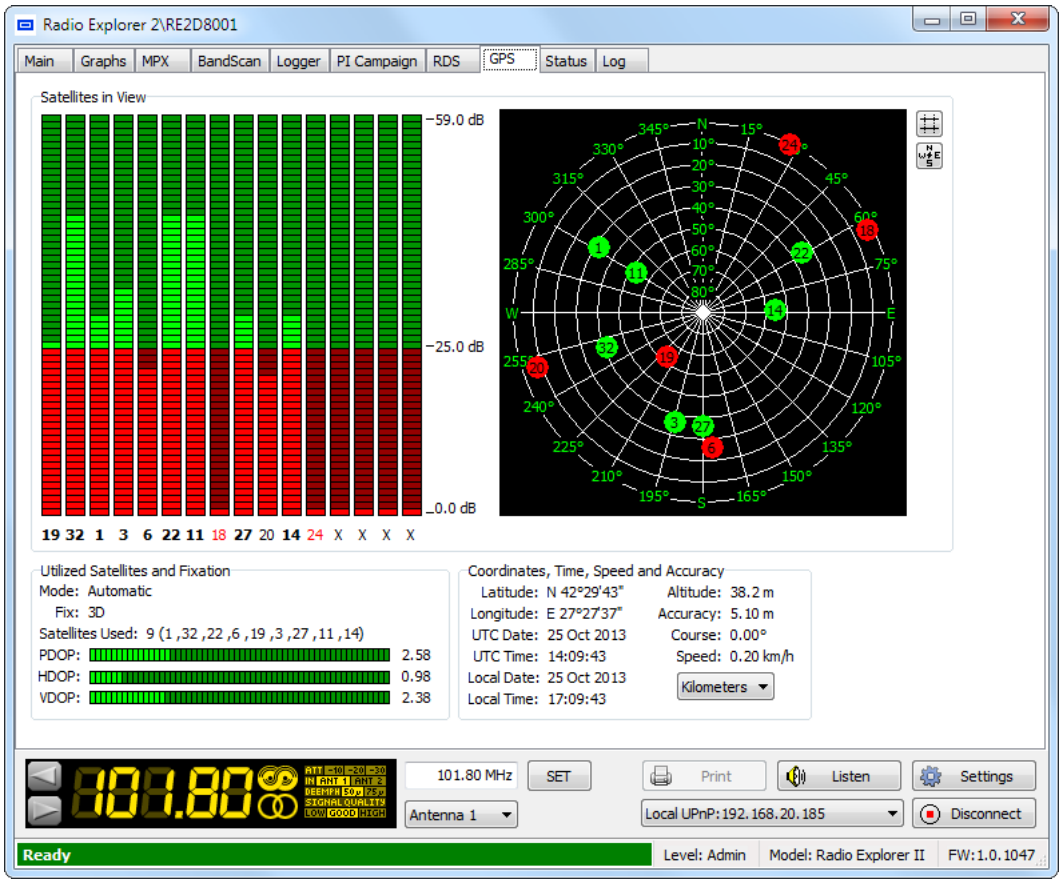
- Set the Campaign's start time delay;
- Set the following parameters for each of the stations you would like to observe – PI/CALL, Name of the station and Acquisition time.
- In order for a station to be included in the campaign, the "Antenna 1" button should be selected; to exclude a station from the campaign the "Disable" button should be selected.

NOTE: In order for a Campaign to be commenced the device should be inactive for the specified time. During the campaign, the device should be inactive - the front panel navigational menu, WEB interface or SNMP should not be used.

GPS

This function is supported by:

- Radio Explorer II – Mobile FM Radio Analyzer.



Satellites in View:

This section contains information about satellites in view. The LED indicators show the reception quality for every satellite. The number beneath every LED is Satellite ID.

Utilized Satellites and Fixation:

- Fix Mode: Fix Mode is a direct result from satellites in view, as well as their position in the sky.
- Satellites Used: Satellites included in Fix and DOP (Dilution of Precision) calculation.
- PDOP (Position Dilution of Precision), HDOP (Horizontal Dilution of Precision), VDOP (Vertical Dilution of Precision) - A Root Mean Square (RMS) measure of the effects that any given position solution geometry has on position errors. Geometry effects may be assessed in the local horizontal (HDOP), local vertical (VDOP) or three-dimensional position (PDOP) for example.

Coordinates, Time, Speed and Accuracy:

This section contains information about the position attributes - Latitude, Longitude, Date, Time, Altitude, Accuracy, Speed and Course. The readings are “Fix Mode” dependent i.e. better Fixation provides more accurate values.

The GPS Speed is measured in knots (standard value) which may be automatically converted into miles or kilometers by choosing the relevant value using the drop-down menu.

Sky View is an alternative representation of “Satellites in View”. Every satellite is represented as a 2D point in space, according to Elevation, Azimuth and signal quality of the satellite. Sky View gives a general idea of how satellites are scattered through the visible sky. The bigger the distance better the Dilution of Precision. Satellites with insufficient signal quality are colored in red.

NOTE: Azimuth (measured in degrees from 0° (North) to 359°) and elevation (measured in degrees from 0° to 90°) are angles used to define the apparent position of an object in the sky, relative to a specific observation point.

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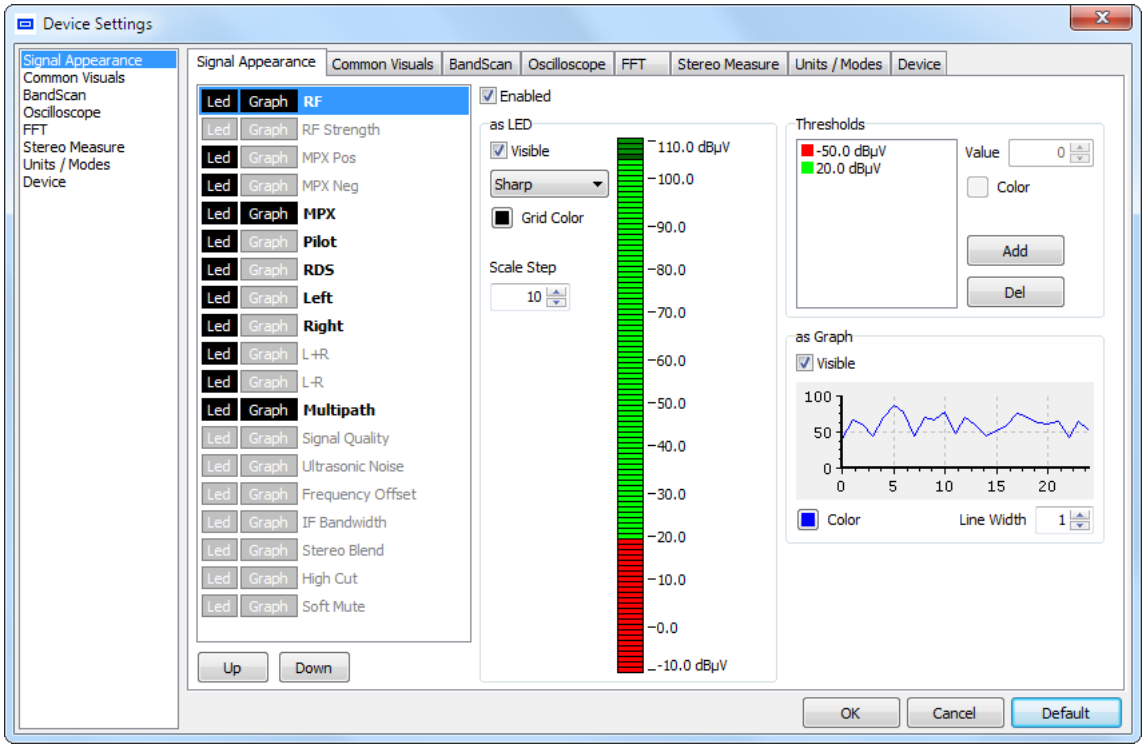
Device Control Window Settings

SIGNAL APPEARANCE



A list of all visualized parameter readings is found on the left part of the screen. Using the *UP* and *DOWN* buttons (placed below the list), upon selection of a measurement, the current position of the parameter could be changed.

Having in mind that visual perception differs from person to person, the program offers options to alter the look of most of its parts.

LEDs visual appearances is managed via the "**as LED**" section. There are four types of visualization:

– Sharp – Semi-Sharp – Semi-Clear – Clear

The selected LED representation of the parameter could be visible or not by selecting (or not) the corresponding check-box. The Grid color and Scale step could also be managed.

The Grid color could be changed upon clicking on the square button, referred to this option.

NOTE: Each parameter is managed independently i.e. settings applied to RF will not be referred to the other parameters.

"**Thresholds**" Section – In order for the visualized data to be read at a glance, the different values could be represented as color codes. A Threshold should be first selected in order its value and color to be edited. Once selected the new value should be written in the corresponding box. New Threshold is added via the "Add" button and deleted via the "Del" button.

"**as Graphs**" Section – The parameter appearance in the Graph tab (graph color and line width) is managed through here.

Upon completion, in order for the applied settings to take place, click on the "OK" button. If not click on "Cancel" or "Default". The "Default" button could be used at any time of the work process if the parameter appearance should be reset to its factory defaults.

COMMON VISUALS

"Graphs" & "LED Display" sections - different visual appearances could be combined by the user in order the desired look to be achieved.

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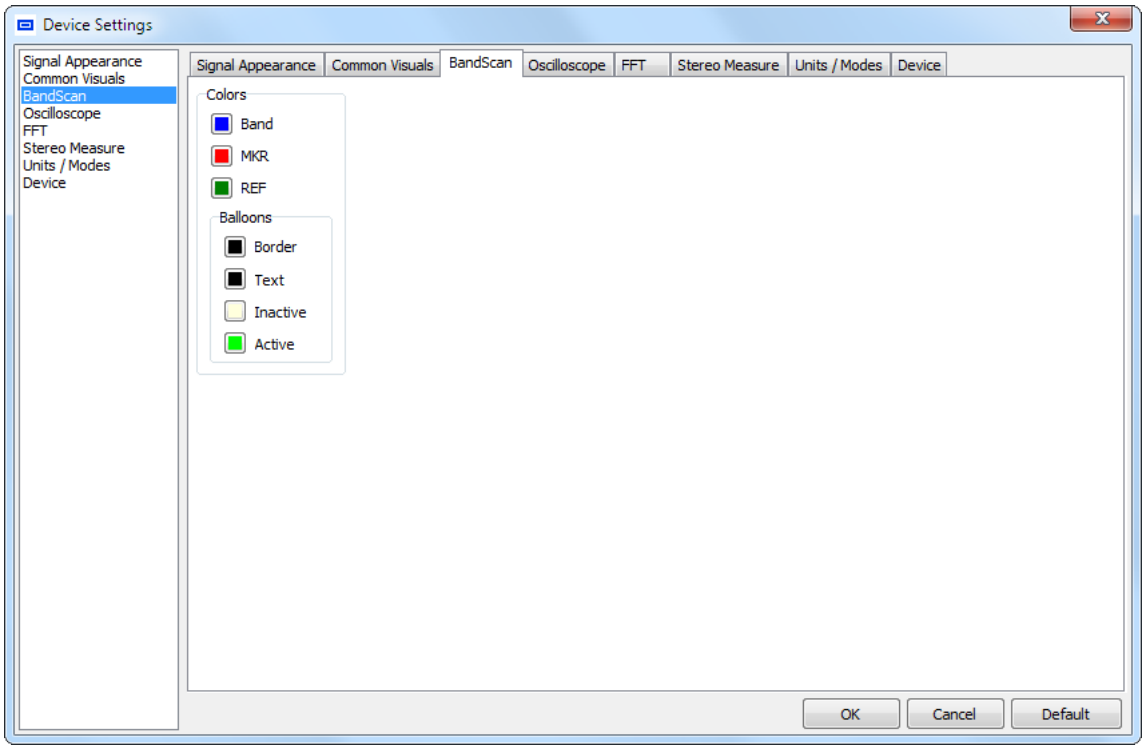
BANDSCAN



Color codes different from the default ones could be set using this tab of the Settings.

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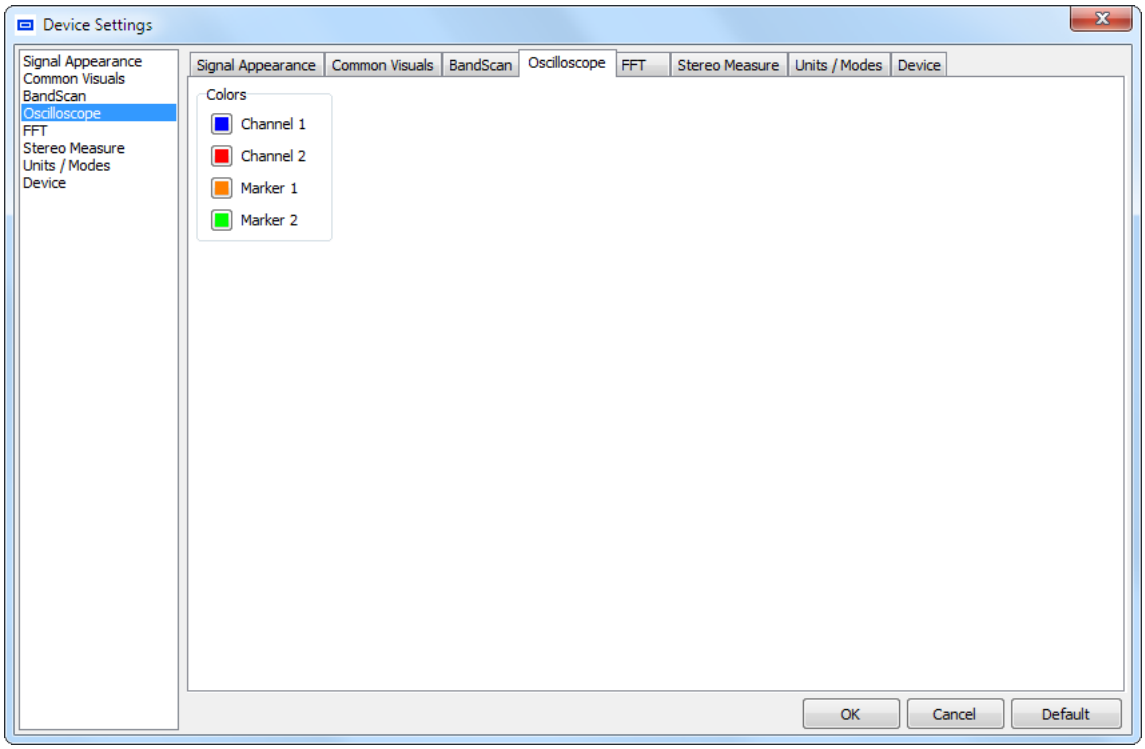
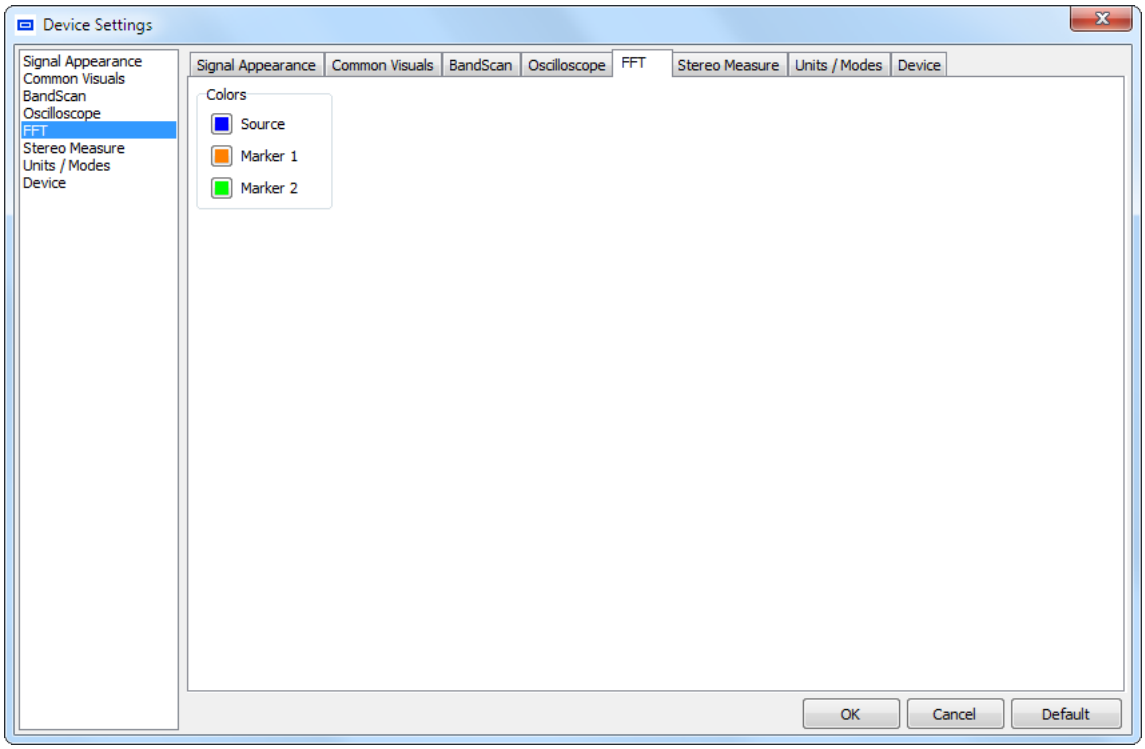
OSCILLOSCOPE



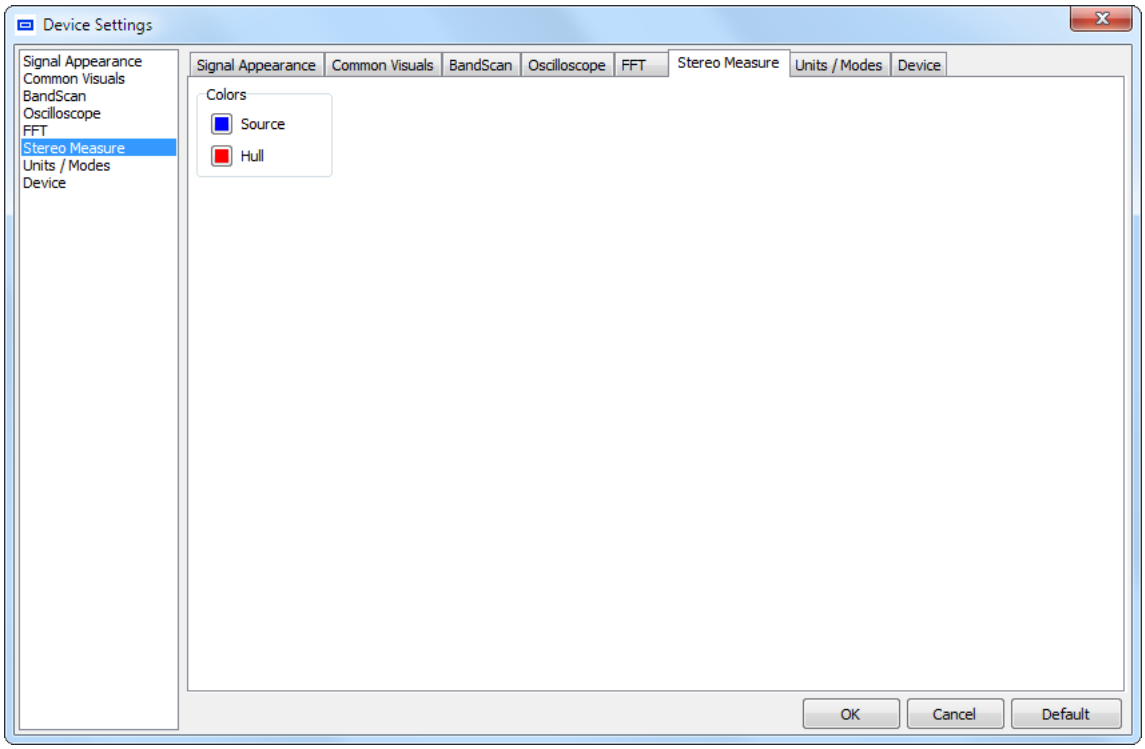
Color codes different from the default ones could be set using this tab of the Settings.

FFT



Color codes different from the default ones could be set using this tab of the Settings.

STEREO MEASURE



Color codes different from the default ones could be set using this tab of the Settings.

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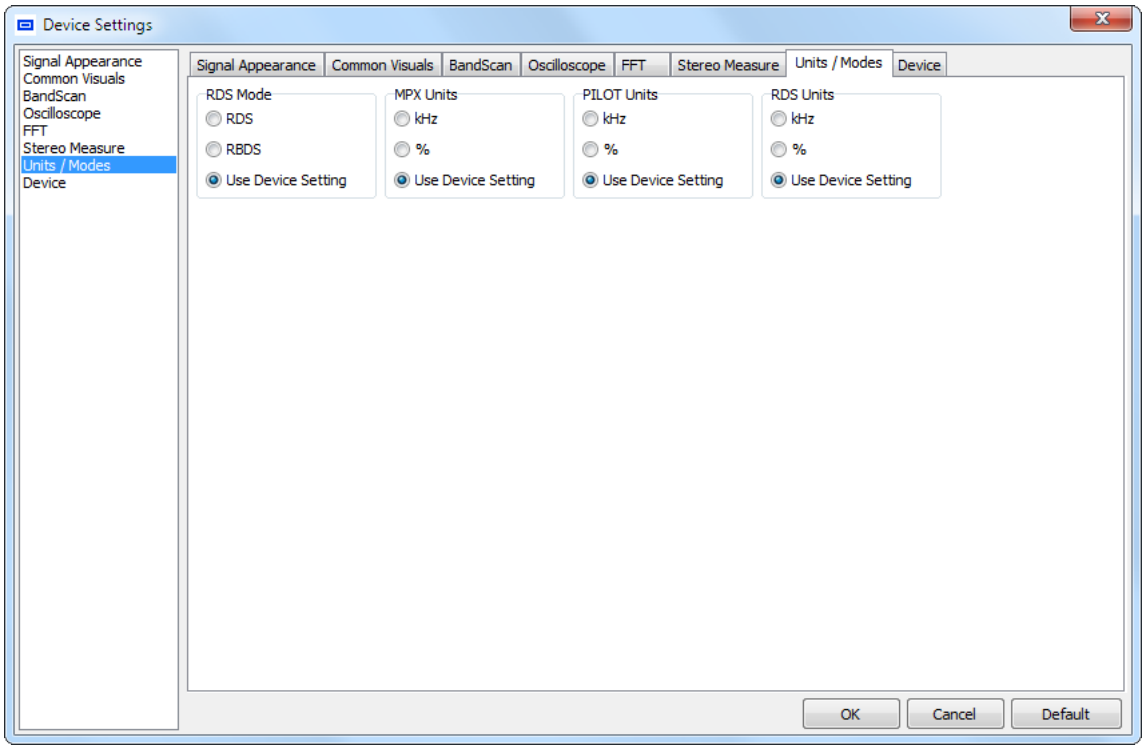
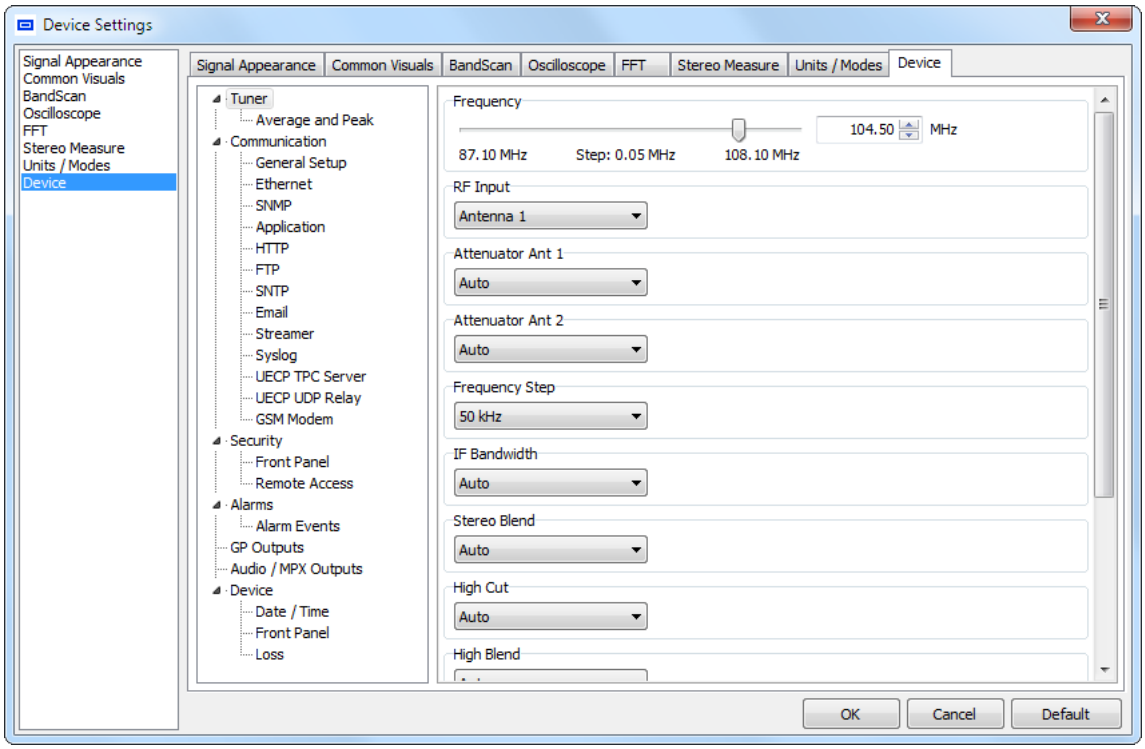
UNITS/MODES



You can switch from RDS to RBDS mode via “RDS Mode” section. The preferred units for visualization of the MPX, PILOT and RDS could also be customized. “Use Device Settings” option will use the defined in the device settings.

DEVICE



A list of all available Device settings is found on the left-side of the menu. Depending on the currently connected device the settings are contextually different.

DEVA Device Manager provides you with protected access to the device settings. You can choose between two types of log in.

- As an ADMINISTRATOR– which will give you full control over the device's settings;
- And as a USER log-in that will allow you to just monitor the device and choose different stations, but the SETTINGS bar remains locked.

NOTE: In order for the device access, to be enhanced, the default values could be modified only by the administrator.

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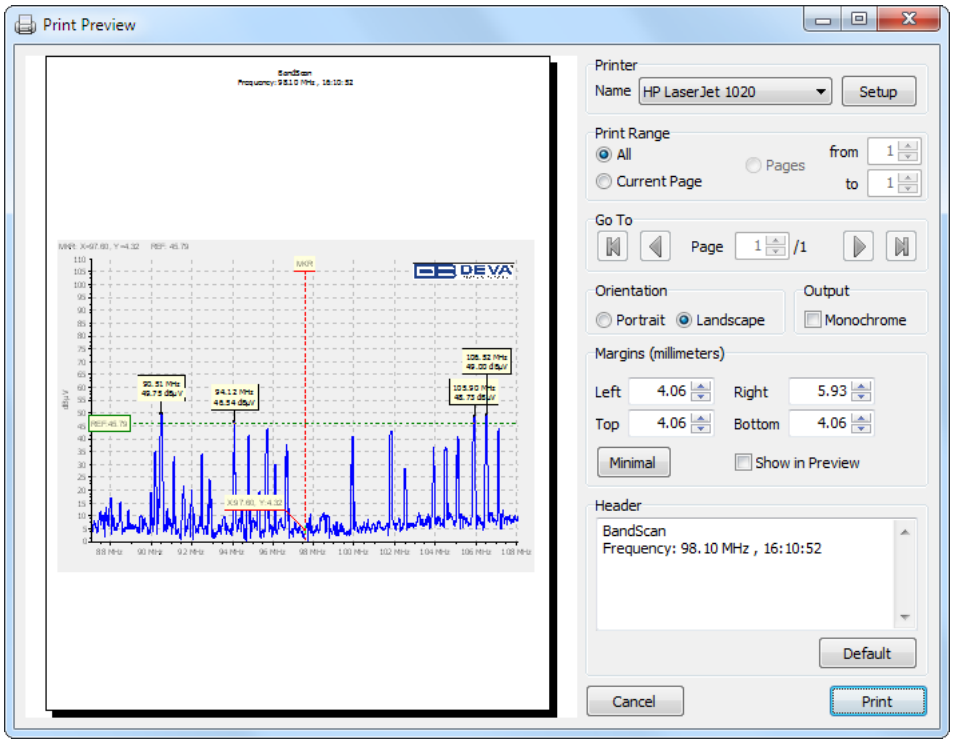
Print Capabilities

The content, of the dialog window differs from tool to tool, but the functionality remains the same. Once the Print button is selected the following window will appear:



Select the printer from the Printer drop-down. If necessary, the Printer settings could be modified from the Setup button (paper size, orientation, etc.).

Print Range section – Only the selected pages will be printed.

Go To section – the currently previewed page can be changed.

Orientation section – the direction of the image is set through here or how it will print on a printer.

Output can be set to Monochrome (independently of printer capabilities) which will automatically convert the graphic(s) from color to monochrome.

Margins section allows predefining of the reserved white space around graphic(s). Click on the Minimal button will set margins to the minimum allowed values for the selected printer.

Show in Preview check box - shows/hides margins in preview as dotted lines (which will not be printed).

Header section - allows adding of user-defined which can be restored to default by Default button.

Once the desired properties are applied click on “Print” button to print the graphic.

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PRODUCT REGISTRATION CARD

• All fields are required, or warranty registration is invalid and void

Your Company Name_____

Contact_____

Address Line 1_____

Address Line 2_____

City_____

State/Province_____ ZIP/Postal Code_____

Country_____

E-mail_____ Phone_____ Fax_____

Which DEVA Broadcast Ltd. product did you purchase?_____

_____

_____

Product Serial #_____

Purchase date____/____/____ Installation date____/____/____

_____
Your signature*

*Signing this warranty registration form you are stating that all the information provided to DEVA Broadcast Ltd. are truth and correct. DEVA Broadcast Ltd. declines any responsibility for the provided information that could result in an immediate loss of warranty for the above specified product(s).

Privacy statement: DEVA Broadcast Ltd. will not share the personal information you provide on this card with any other parties.

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WARRANTY TERMS AND CONDITIONS

I. TERMS OF SALE: DEVA Broadcast Ltd. products are sold with an understanding of "full satisfaction"; that is, full credit or refund will be issued for products sold as new if returned to the point of purchase within 30 days following their receipt, provided that they are returned complete and in an "as received" condition.

II. CONDITIONS OF WARRANTY: The following terms apply unless amended in writing by DEVA Broadcast Ltd.

A. The Warranty Registration Card supplied with this product must be completed and returned to DEVA Broadcast Ltd. within 10 days of delivery.

B. This Warranty applies only to products sold "as new." It is extended only to the original end-user and may not be transferred or assigned without prior written approval by DEVA Broadcast Ltd.

C. This Warranty does not apply to damage caused by improper mains settings and/or power supply.

D. This Warranty does not apply to damage caused by misuse, abuse, accident or neglect. This Warranty is voided by unauthorized attempts at repair or modification, or if the serial identification label has been removed or altered.

III. TERMS OF WARRANTY: DEVA Broadcast Ltd. products are warranted to be free from defects in materials and workmanship.

A. Any discrepancies noted within TWO YEARS of the date of delivery will be repaired free of charge, or the equipment will be replaced with a new or remanufactured product at DEVA Broadcast Ltd. option.

B. Parts and labor for factory repair required after the one-year Warranty period will be billed at prevailing prices and rates.

IV. RETURNING GOODS FOR FACTORY REPAIR:

A. Equipment will not be accepted for Warranty or other repair without a Return Authorization (RA) number issued by DEVA Broadcast Ltd. prior to its return. An RA number may be obtained by calling the factory. The number should be prominently marked on the outside of the shipping carton.

B. Equipment must be shipped prepaid to DEVA Broadcast Ltd.. Shipping charges will be reimbursed for valid Warranty claims. Damage sustained as a result of improper packing for return to the factory is not covered under terms of the Warranty and may occasion additional charges.

APPENDIX A

RDS: EUROPE VS AMERICA

The European Broadcasting Union (EBU) and its member countries originated the concept of "Radio Data" transmission. The European RDS specification, CENELEC Standard EN50067, was first published in 1984. It was revised in 1986, 1990, 1991 and 1992.

European RDS has grown in use following initial adoption of the Standard. RDS is nearly universal throughout Europe; it is almost impossible to find a European FM broadcasting station that does not carry a radio data subcarrier.

The popularity of RDS in Europe is very much in contrast with initial reluctance on the part of US broadcasters to embrace this technology. This can be ascribed to material differences in broadcasting practices.

Almost without exception, FM broadcasting in the United States is 'detached' and independent - each station originates its own programming. America's National Public Radio might be considered as an exception, though for most of the broadcast day even NPR stations originate, or at least schedule, their own programs.

Most of European broadcasting is similar to the concept of network radio that was common in the US prior to the 1950s. In Europe, a central program originator may have many transmitting facilities of modest power situated throughout the country, at several different frequencies to blanket a designated service area. The European disposition, toward lower-power transmitters can be found on the "local radio" level, as well.

The European concept of a service area equates to the US broadcaster's market. The subtle difference between these designations further characterizes broadcasting practices and ethics. RDS benefits the European broadcaster through almost an altruistic endeavor to be of service to his listeners. The US broadcaster is marketing his programming and is primarily interested in how he can create additional revenue from RDS.

THE RDS SYSTEM

RDS is a digital data channel, transmitted as a low-level subcarrier above the range of the composite stereo program signal in the FM baseband. The data transmission (baud) rate is comparatively low, yet it is quite robust because of data redundancy and effective error correction.

It is not within the scope of this Manual to cover the details of RDS subcarrier coding and modulation. For this, the reader is directed to the Specification appropriate to his location either the CENELEC EN50067 Specification for Europe or the United States NRSC Specification. Since the Manual will deal with specific implication of RDS implemented with the DEVA Device Manager, it is assumed that the user is familiar with the RDS concept.

APPENDIX B.1

RDS APPLICATIONS SUPPORTED

Following is an alphabetical list of the RDS applications supported by DEVA Device Manager. The standardized RDS application abbreviation is followed by an expansion of the application name and a short explanation of the function.

AF

List of Alternative Frequencies: In order holes in the coverage area to be filled, list of all frequencies where identical program could be heard simultaneously can be included by the network broadcaster or one with low-power rebroadcast transmitters (translators). The RDS receiver (particularlythe upscale car radio) constantly searches for the best signal that carries the same program. The radio will re-tune without noticeable interruption, when a better signal is found. The principal utility of this RDS function is with European radio networks and US stations with 'translators.'

CT

Clock Time and date: Time and date codes should use Coordinated Universal Time (UTC) and Modified Julian Day (MJD). If MJD = 0, the receiver should not be updated. The listener, however, will not use this information directly and the conversion to local time and date will be made in the receiver's circuitry. CT is used as time stamp by various RDS applications and thus it must be accurate.

DI

Decoder Information: This is one of several 'flags' that convey yes/no or other very basic data. This flag helps the receiver to indicate whether the broadcast is monaural or is transmitted in any of several methods of stereo or binaural broadcasting. As many as 16 encoding options may be accommodated! This is a rather esoteric function and, thus far, remains unused both in Europe and in the US.

ECC

Extended Country Code: RDS uses its own country codes. The first most significant bits of the PI code carry the RDS country code. The four bit coding structure only permits the definition of 15 different codes, 1 to F (hex). Since there are much more countries to be identified, some countries have to share the same code which does not permit unique identification. Hence there is the need to use the Extended Country Code which is transmitted in Variant 0 of Block 3 in type 1A groups and together with the country identification in bits b15 to b12 of the PI code render a unique combination. The ECC consists of eight bits.

EON

Enhanced Other Networks information: This feature can be used to update the information stored in a receiver about program services other than the one received. The alternative frequencies-PS name, Traffic Program and Traffic Announcement identification as well as Program Type and Program Item Number information can be transmitted for each other service. The relation to the corresponding program is established by means of the relevant Program Identification. Linkage information, consisting of four data elements, provides the means by which several program services may be treated by the receiver as a single service during times a common program is carried. Linkage information also provides a mechanism to signal an extended set of related services.

EWS

Emergency Warning System: The EWS is intended to provide coding for warning messages. These messages will be broadcasted only in case of emergency and will be evaluated by special receivers.

IH

In House application: This refers to data to be decoded only by the operator. Some examples noted are identification of transmission origin, remote switching of networks and paging of staff. The applications of coding may be decided by each operator itself.

M/S

Music / Speech Switch: This flag simply indicates whether music or speech is the primary broadcast programming. The purpose of this function is not well explained in the respective Standards; hence it comes as no surprise that it is not widely used.

ODA

Open Data Applications: The Open Data Applications feature allows data applications, not previously specified in EN 50067, to be conveyed in a number of allocated groups in an RDS transmission. The allocated groups are indicated by using type 3A group which is used to identify to a receiver the data application in use in accordance with the registration details in the EBU/RDS Forum - Open Data Applications Directory and the NRSC Open Data Applications Directory.

PI

Program Identification: This block of data identifies the broadcast station with a hexadecimal numerical code, which becomes the “digital signature” of the station. The code is assigned by the broadcasting authorities in most countries, but in the US it is calculated from a numerical encoding of station call letters. The receiver processes the PI code to assist automatic tuning features (station memories), and to prevent false switching to alternative frequencies that might be shared by broadcasters in nearby regions.

PIN

Program Item Number: The code enables the designed to use this feature receivers and recorders to respond to the preselected by the user program item(s).This feature is used via scheduled program time, to which in order to avoid ambiguity is added the day of the month.

PS

Program Service Name: This is the station's "street name" that will appear on the receiver faceplate display. The PS can be up to eight characters in length (including spaces) and can be as simple as the station's call letters: KWOW or KWOW FM, or a slogan: NEWSTALK or LIVE 95. The Program Service Name is automatically displayed, even on the automobile receivers. Because of driving safety considerations broadcasters are generally discouraged from scrolling messages in this field.As a matter of fact, it is a violation of both the CENELEC and the NRSC standards to scroll the PS display, although the practice has become universally common.

PTY

Program Type: The PTY data flag identifies the station format from a collection of pre-defined categories. Many RDS receivers are able to seek the listener's preferred format automatically. This means that a car radio can switch from a fading station to a stronger one that carries the same variety of music, though not the very same program, as provided by AF switching. The PTY function of RDS helps a broadcaster catch 'transient audience' share. A listing of the PTY categories is given in "APPENDIX C.1" on page 91 and "APPENDIX C.2" on page 92.

Under some programming circumstances, the PTY identifier may be made 'dynamic,' changing between categories for a station that "dayparts" (changes its format for specific time periods). The PTY code is not meant to change from song to song or to accommodate a top-of-the-hour newscast, however.

PTYN

Program TYpe Name: The PTYN feature allows the predefined by the RDS/RBDS Standard PTY to be further described using user-defined text (e.g. PTY=4: Sport and PTY=8: Football). The PTYN is not intended to change the default eight characters of PTY which will be used during search or wait modes. Its purpose is to show in details the program type once tuned to a program. If the broadcaster is satisfied with the default PTY name, it is not necessary to use additional data capacity for PTYN. The Program Type Name is not intended to be used for automatic PTY selection and must not be used for giving sequential information.

RT

RadioText: This is a 64-character block of plain text that the listener can select for visual display on the faceplate of the radio by pressing an INFO button on the receiver. This function is not available on many automobile radios for safety reasons, which has precipitated the frowned-upon practice of scrolling the PS field instead.

Most radios have limited alphanumeric display capability, so the 64 characters of RadioText march across the front panel, much akin those annoying LED advertising signs found in airport buses or fast food emporia. Like the scrolling-PS implementation, RadioText can announce song titles and performers, run special promotions or contests, or broadcast sponsors' messages.

RT+

RadioText Plus is “semantic analogue radio”. It allows the RDS feature RadioText (RT) to be read by the FM RDS receiving terminals. Based on the RDS RT messages, RT+ is completely backwards compatible with RT. The usage of RT+ allows the listener/user to derive additional benefits from the RDS Radio Text service. It enables FM RDS receivers to “read” Radio Text (to recognize designated objects and make them manageable) by user’s direct access to specific elements of the Radio Text messages. For example, that element could be programme associated metadata like Title and Artist of the currently playing song or a news headlines. This provides the listener with an “mp3-player feeling” while listening to analogue FM radio. The elements can also carry additional service messages or information about the Radio Station such as the telephone number or the web address of the Radio Station’s hotline. These objects, or more accurately RT+ information elements carried in the RDS RadioText (RT) messages, are identified by their location within the RT messages and by the class code of their content type. Once an information element is received and understood, a receiver is able to, for example, store the different RT+ information elements and the listener may then select and request a specific content type from the radio’s memory at an instant in time that suits the listener’s needs. Thus the listener is no longer forced to watch the RT information passing (scrolling) by. Moreover, RT+ offers selected RT message elements to car drivers on a static display, without risk of distracting the attention of the driver. Furthermore, RT+ is well suited for mobile phones with built-in FM receivers: telephone numbers can be directly used to initiate calls, and web addresses can be used to start browsing the web content offered by the radio programme provider. Last but not least, RT+ is also used for satellite radio broadcasting via DVB-S. It may be adopted by DRM and DAB in the future, too

TA

Traffic Announcement: This is a temporary flag added to the RDS data stream only as a traffic bulletin is being aired. Some RDS car radios can be set to search for traffic bulletins among various TP stations (see TP below) while tuned to a listener’s preferred program, or even while playing a tape or CD. As soon as any TP station broadcasts a traffic bulletin, the receiver temporarily switches-over to receive it. When the bulletin is finished, the receiver switches back to the original program, tape or CD.

TDC

Transparent Data Channels: The transparent data channels consist of 32 channels, which may be used to send any type of data.

TMC

Traffic Message Channel: This feature is intended to be used for the coded transmission of traffic information.

TP

Traffic Program Identification: The TP flag identifies the station as one that routinely broadcasts traffic bulletins for motorists as part of its normal, everyday programming. When the TP flag is displayed on the receiver faceplate, the radio is searching for traffic announcements. The radio keeps track of TP stations offering this service to speed up the search-and-switch process.

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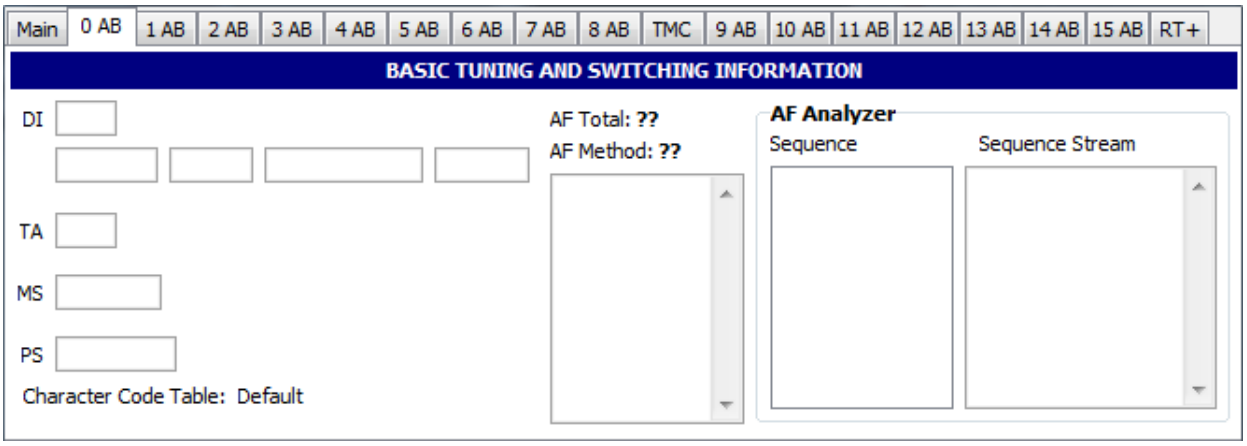
APPENDIX B.2

Short description of all groups analyzed

TYPE 0A & 0B GROUPS: BASIC TUNING AND SWITCHING INFORMATION

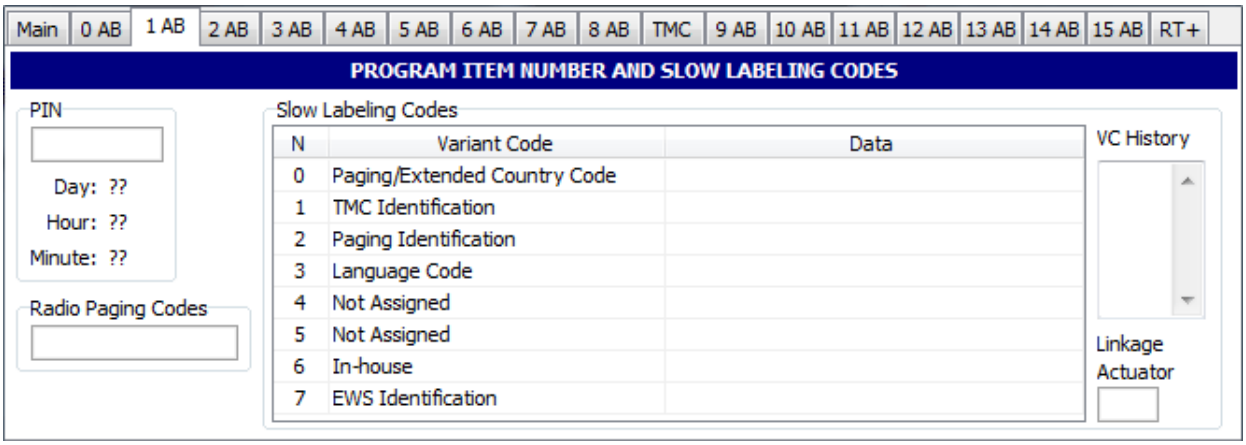
Type 0A groups are usually transmitted whenever alternative frequencies exist. Type 0B groups without any type 0A groups may be transmitted only when no alternative frequencies exist. There are two methods (A and B) for transmission of alternative frequencies. The PS function is also part from this group. The Program Service name comprises eight characters. It is the primary aid to listeners in program service identification and selection.



The Program Service name is used only to identify the station or station program. The PS may be changed as required by the station. Nowadays this feature is used for transmitting artist names, song titles, promos or some kind of advertisement texts.

TYPE 1A & 1B GROUPS: PROGRAM ITEM NUMBER AND SLOW LABELING CODES

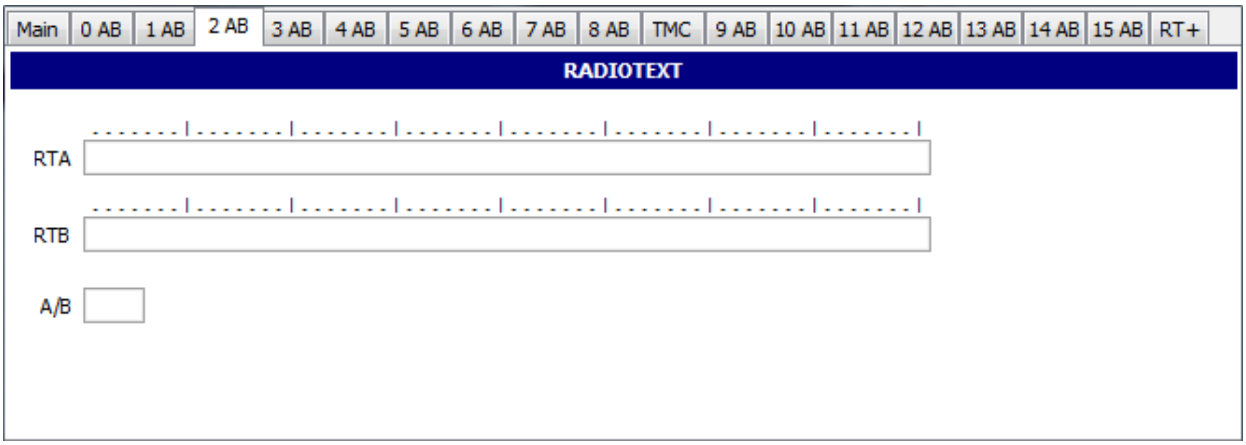
Program Item Number, Type 1B group - The Program Item Number is the scheduled broadcast start time and day of the month as published by the broadcaster. The day of the month is transmitted as a five-bit binary number in the range 1-31. Hours are transmitted as a five-bit binary number in the range 0-23. The spare codes are not used. Minutes are transmitted as a six-bit binary number in the range 0-59. The spare codes are not used.



The most significant five bits in block 4 which convey the day of the month, if set to zero, indicate that no valid Program Item Number is being transmitted. In this case, if no Radio Paging is implemented, the remaining bits in block 4 are undefined. However, in the case of type 1A groups only, if Enhanced Radio Paging is implemented, the remaining bits carry Service Information.

TYPE 2A & 2B GROUPS: RADIOTEXT

The 4-bit text segment address defines the position of the text segments (in the current text) contained in the third (version A only) and fourth blocks. Since each text segment, in version 2A groups comprises four characters, messages of up to 64 characters in length can be sent using this version. In version 2B groups, each text segment comprises only two characters and therefore when using this version the maximum message length is 32 characters.



If a display which has fewer than 64 characters is used to display the radiotext message then memory should be provided in the receiver/decoder so that elements of the message can be displayed sequentially. This may, for example, be done by displaying elements of text one at a time in sequence or, alternatively, by scrolling the displayed characters of the message from right to left.

An important feature of type 2 groups is the Text A/B flag contained in the second block. Two situations may occur:

- If the receiver detects a change in the flag (from binary “0” to binary “1” or vice-versa), then the whole radiotext display should be cleared, and the newly received radiotext message segments should be written into the display.
- If the receiver detects no change in the flag, then the received text segments or characters should be written into the existing displayed message, and those segments or characters for which no update is received should be left unchanged.

When this application is used to transmit a 32-character message, at least three type 2A groups or at least six type 2B groups should be transmitted in every two seconds.

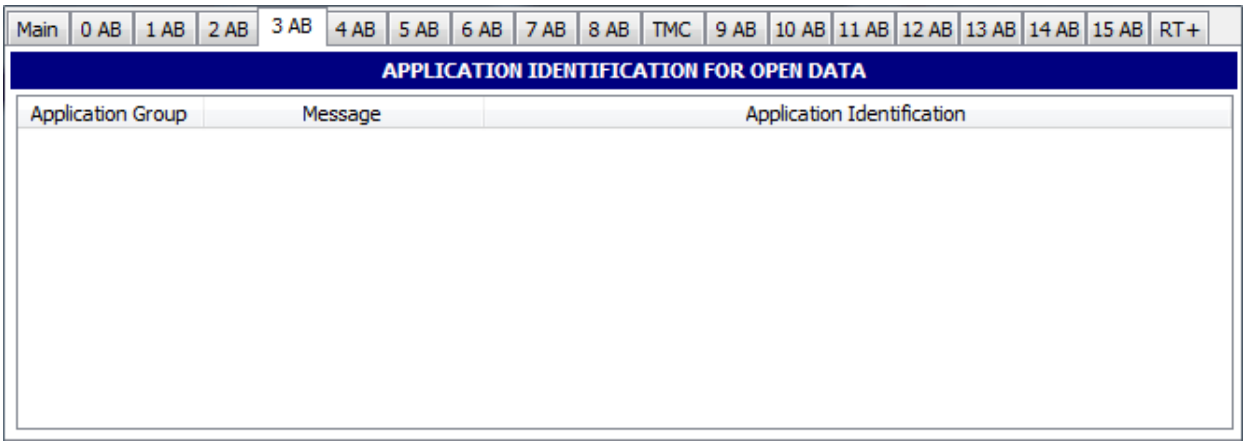
TYPE 3A & 3B GROUPS: APPLICATION IDENTIFICATION FOR OPEN DATA

The type 3A group conveys, to a receiver, information about the Open Data Applications carried in a particular transmission and in which groups could they be found.

The type 3A group comprises three elements:

– Application Group type code used by that application, 16 message bits for the actual ODA and the Applications

– Identification (AID) code. Applications which actively utilize both, type A and B groups, are signaled using two type 3A groups. The Application Group type code indicates the group type used, in the particular transmission, to carry the specified ODA. Two special conditions may be indicated: 00000 - Not carried in associated group; 11111 - Temporary data fault (Encoder status) which means that incoming data to the encoder cannot be transmitted. The AID determines which software handler a receiver needs to use. This supplements information carried in the type 1A group and permits groups specified in this standard for EWS, IH, RP and TMC to be re-allocated when these features are not used. This method of allocating and defining Open Data Applications in an RDS transmission allows the addition and subtraction of ODAs, without constraint or the need to await the publication of new standards. For each group type addressed by the Application Group Type codes of a particular transmission, only one application may be identified as the current user of the channel.



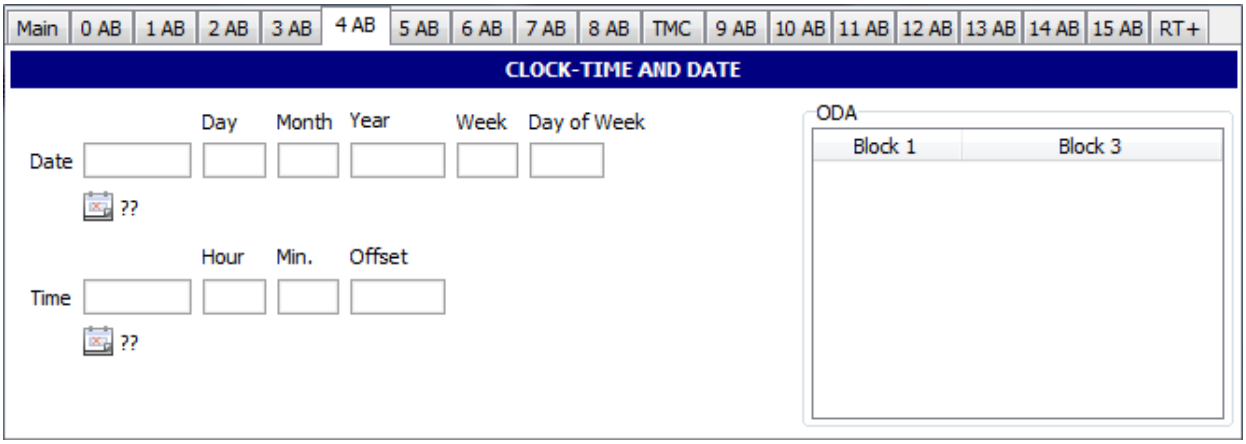
- The AID code 0000 (Hex) may be used to indicate that the respective group type is being used for the normal feature specified in this standard. Application Identification codes 0001 to FFFF (Hex) indicate applications as specified in the ODA Directory. The ODA Directory specification associated with a particular AID code defines the use of type A and type B groups as follows:

– type A groups used alone (mode 1.1);
– type B groups used alone (mode 1.2);
– type A groups and type B groups used as alternatives (mode 2);
– type A groups and type B groups used together (mode 3).

It is important to note that the ODA Directory specification should not specify the actual type A and type B groups to be used, since these are assigned in each transmission by the type 3A group. The AID feature indicates that a particular ODA is being carried in a transmission. Each application will have unique requirements for transmission of its respective AID, in terms of repetition rate and timing. These requirements should be detailed in the respective ODA specification. The specification must also detail the AID signaling requirements for such times when an application assumes or loses the use of a group type channel.

TYPE 4A & 4B GROUPS: CLOCK-TIME AND DATE, OPEN DATA APPLICATION

The transmitted clock-time and date should be accurately set to UTC plus local offset time. Otherwise, the transmitted CT codes shall all be set to zero. When this application is used, one type 4A group will be transmitted every minute. The local time is composed of Coordinated Universal Time (UTC) plus local time offset. The local time offset is expressed in multiples of half hours within the range -12h to +12h and is coded as a six-bit binary number. “0” = positive offset (East of zero degree longitude), and “1” = negative offset (West of zero degrees longitude). The information relates to the epoch immediately following the start of the next group. The Clock time group is inserted so that the minute edge will occur within ± 0.1 seconds of the end of the Clock time group.



Minutes are coded as a six-bit binary number in the range 0-59 (the spare codes are not used). Hours are coded as five-bit binary number in the range 0-23 (the spare codes are not used). The date is expressed in terms of Modified Julian Day and coded as a 17-bit binary number in the range 0-99999. Note that the Modified Julian Day date changes at UTC midnight, not at local midnight. Accurate CT based on UTC plus local time offset should be implemented on the transmission where TMC and/or Radio paging is implemented.

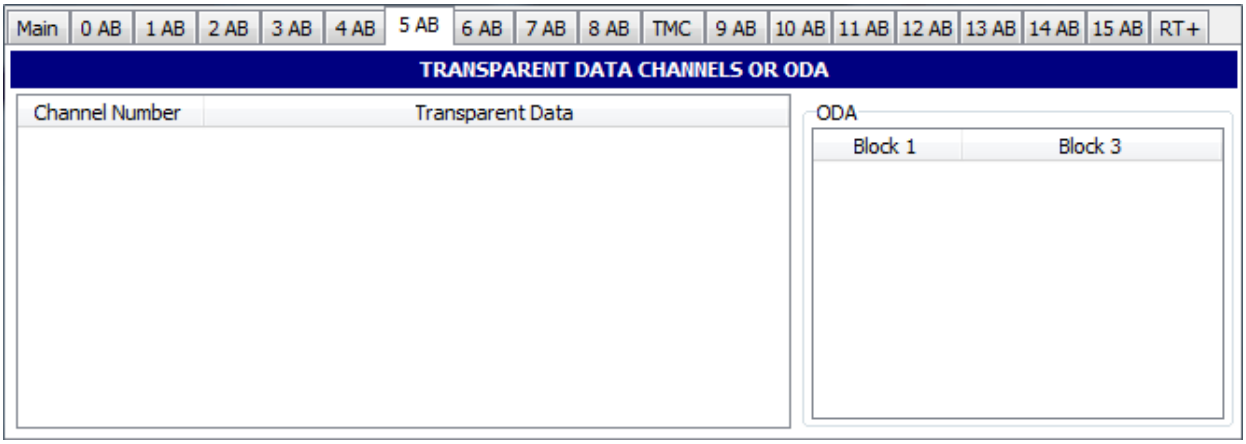
4B groups are usable for Open data (see “Type 3A & 3B groups” on page 77)

TYPE 5A & 5B GROUPS: TRANSPARENT DATA CHANNELS OR ODA

These channels may be used:

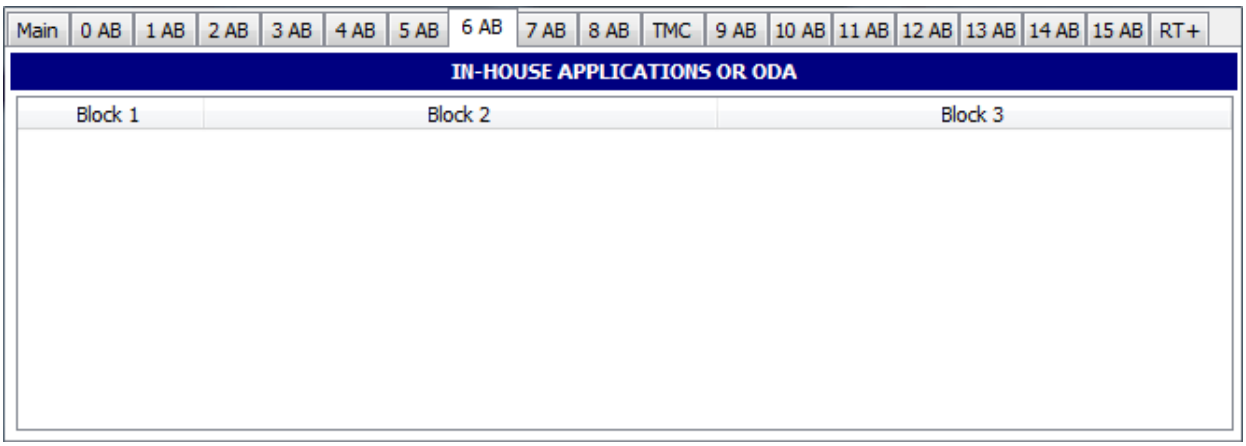
- To send alphanumeric characters or other text (including mosaic graphics);
- for transmission of computer programs and similar data not for display.

Details of implementation of these last options are to be specified later. The repetition rate of these group types may be chosen to suit the application and the available channel capacity at the time.



TYPE 6A & 6B GROUPS: IN-HOUSE APPLICATIONS OR ODA

Type 6A groups are used for ODA and IH. In case, this group is used for ODA applications refer to "Type 3A & 3B groups" description. There are some unreserved bits in these groups. The contents of the unreserved bits in these groups may be defined unilaterally by the operator. Consumer receivers should ignore the in-house information coded in these groups. The repetition rate of these group types may be chosen to suit the application and the available channel capacity at the time.



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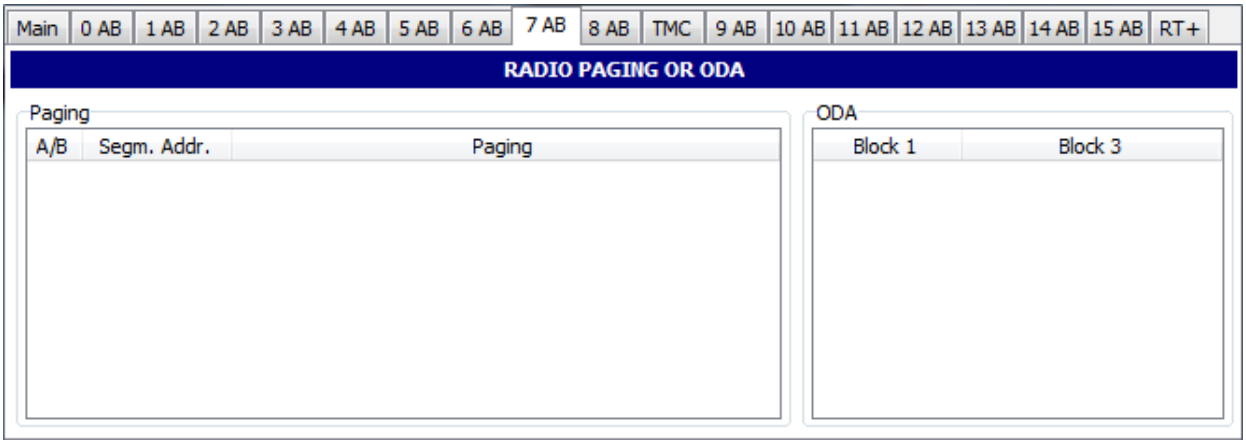
TYPE 7A & 7B GROUPS: RADIO PAGING OR ODA

Type 7A groups are used for Radio Paging or ODA (see “Type 3A & 3B groups” on page 77)



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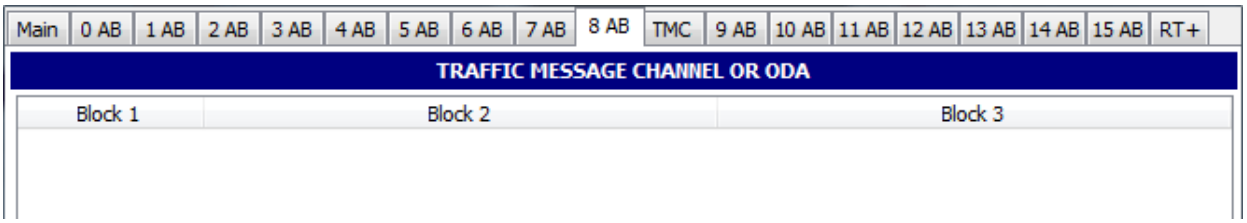
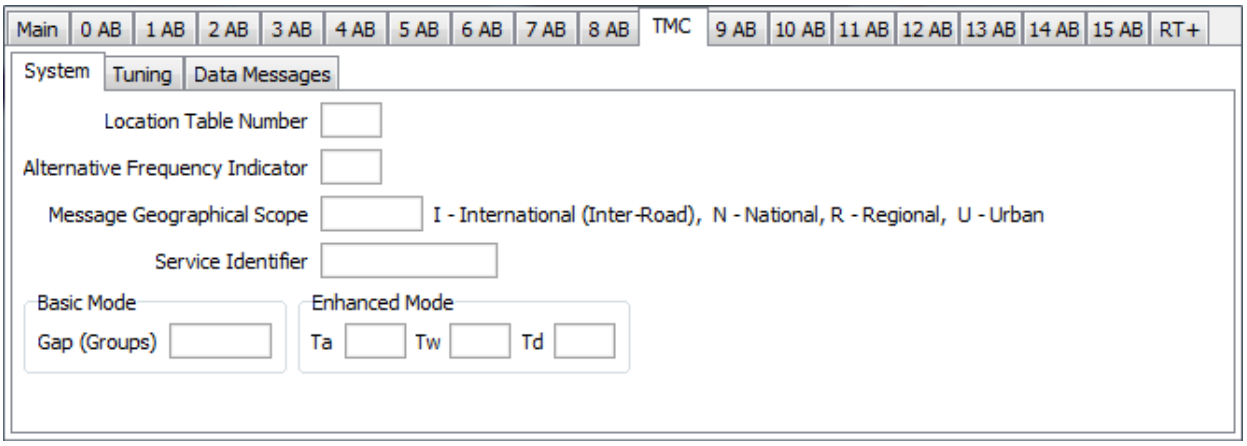
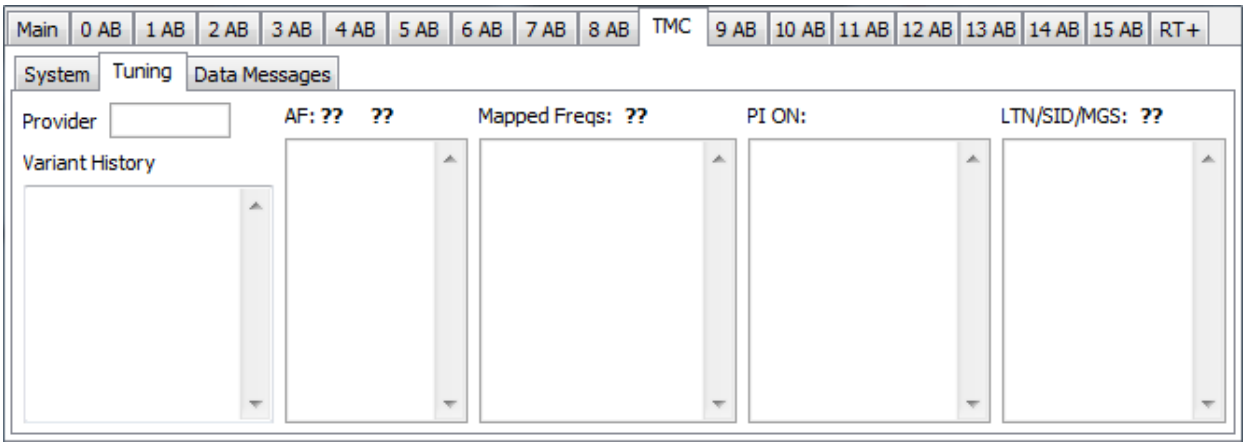
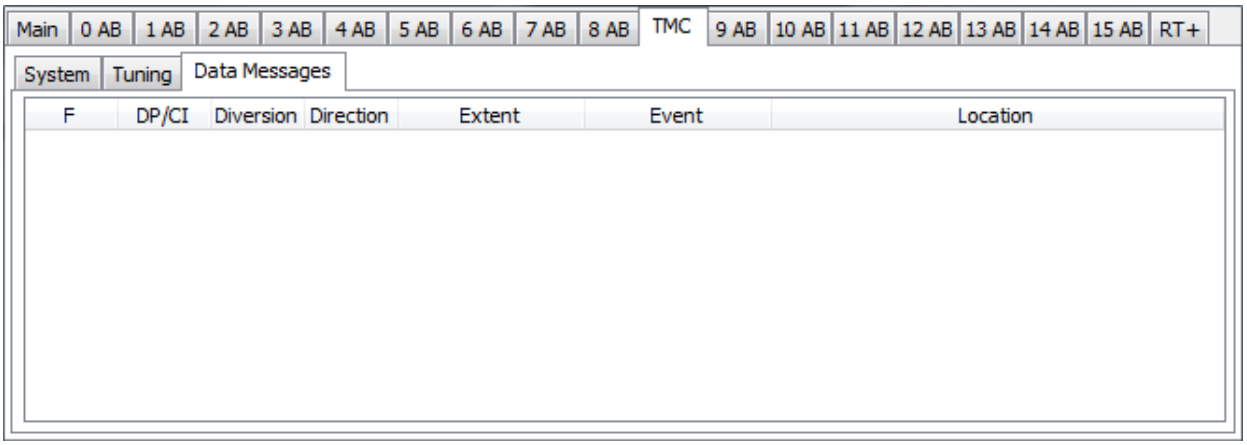
TYPE 8A & 8B GROUPS: TRAFFIC MESSAGE CHANNEL OR ODA

Type 8A groups are used for Traffic Message Channel (TMC); if used for ODA refer to "Type 3A & 3B groups" description. This group carries the TMC messages. The specification for TMC, using the so called ALERT C protocol, also makes use of type 1A and/or type 3A groups together with 4A groups.



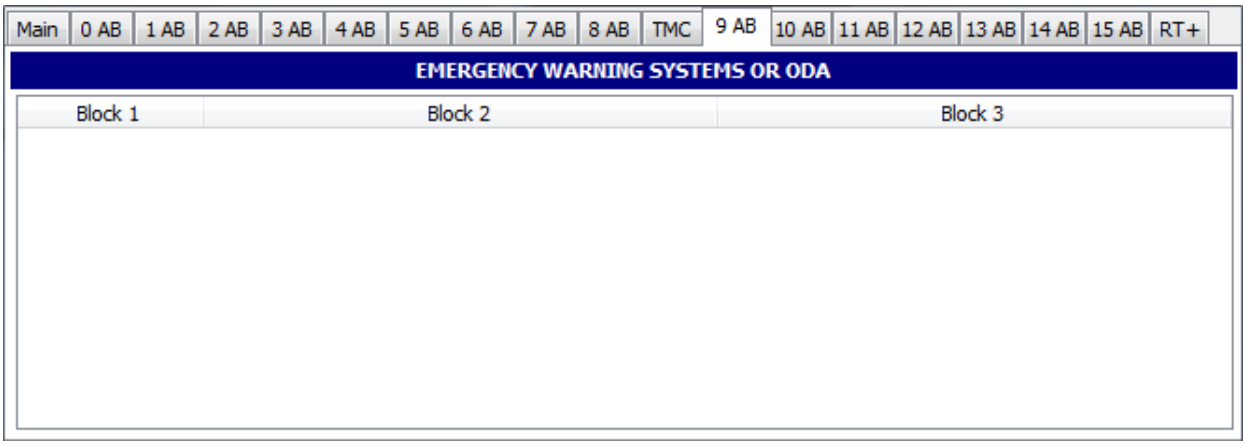






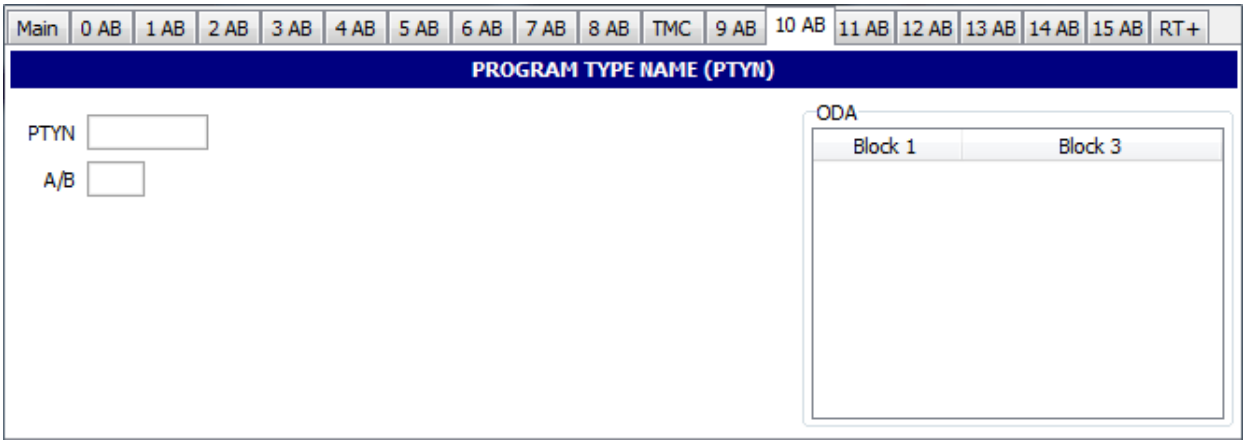
TYPE 9A & 9B GROUPS: EMERGENCY WARNING SYSTEMS OR ODA

These groups are transmitted very infrequently, unless an emergency occurs or test transmissions are required. Type 9A group is used for EWS; if used for ODA refer to "Type 3A & 3B groups" description. The ODA may be used only in type B of these groups. Format and application of the bits allocated for EWS messages may be assigned unilaterally by each country. However, the ECC feature must be transmitted in type 1A groups when EWS is implemented.



TYPE 10A & 10B GROUPS: PROGRAM TYPE NAME (10A) AND OPEN DATA (10B)

The type 10A group allows further description of the current Program Type, for example, when using the PTY code 4: SPORT, a PTYN of "Football" may be indicated to give more details about that program. PTYN should be used only to enhance the Program Type information and it should not be used for sequential information. The A/B flag is toggled when a change is made in the PTYN being broadcast. Program Type Name (PTYN) (for display) is transmitted as 8-bit characters as defined in the 8-bit code tables in annex E. Eight characters (including spaces) are allowed for each PTYN and are transmitted as four character segments in each type 10A group. ODA - Type 10B group see "Type 3A & 3B groups" description.



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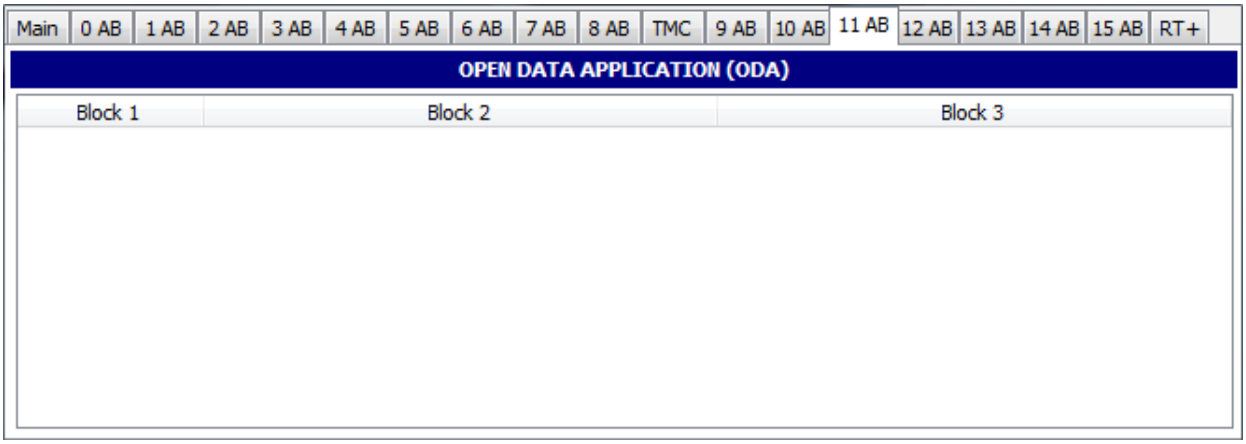
TYPE 11A & 11B GROUPS: OPEN DATA APPLICATION

Open data - Type 11A and 11B groups (see “Type 3A & 3B groups” on page 77)



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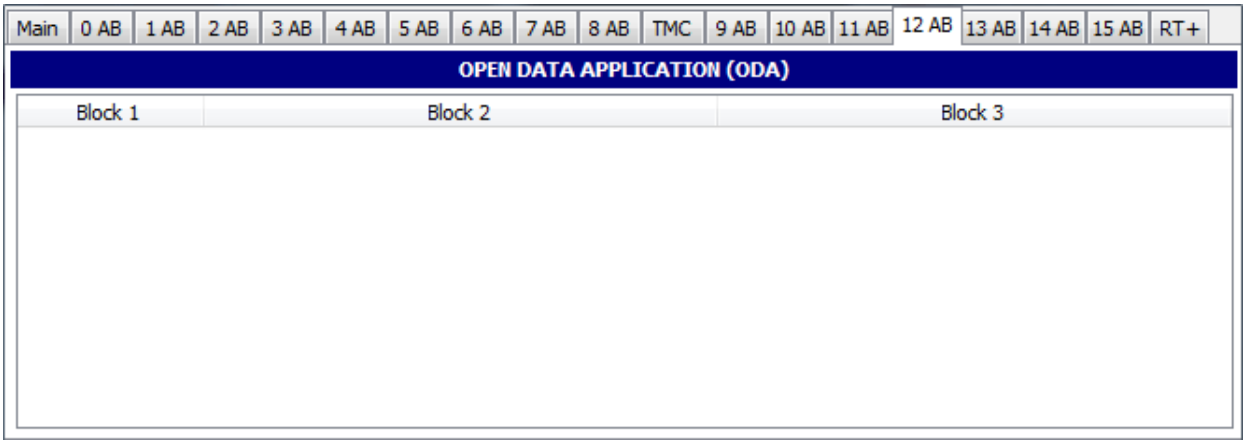
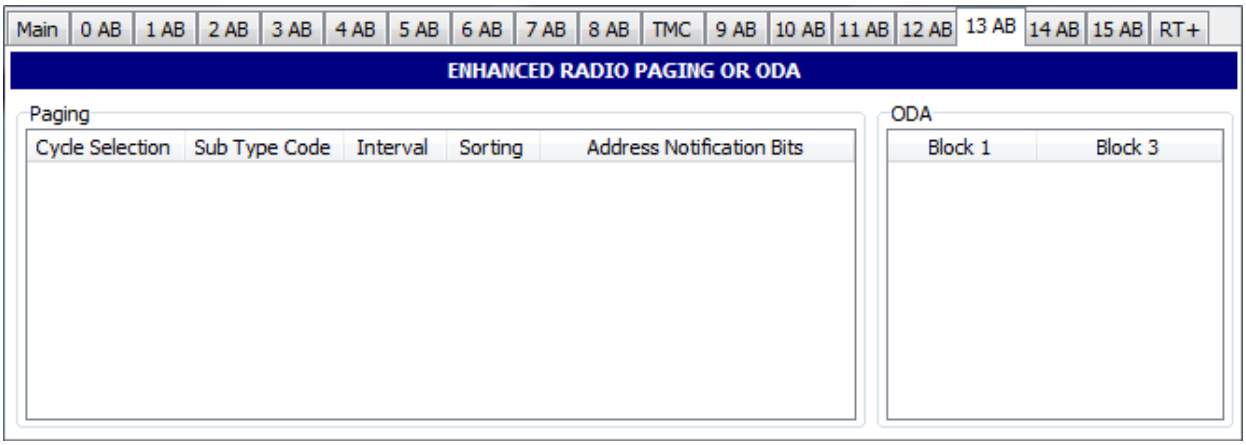
TYPE 12A & 12B GROUPS: OPEN DATA APPLICATION

Open data - Type 12A and 12B groups (see “Type 3A & 3B groups” on page 77)



TYPE 13A & 13B GROUPS: ENHANCED RADIO PAGING OR ODA

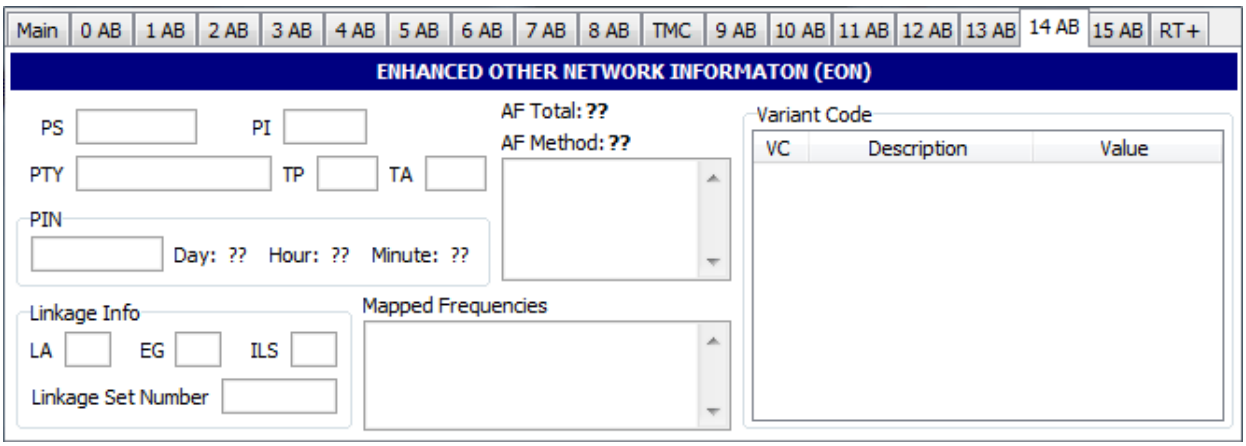
The type 13A group is used to transmit the information relative to the network and the paging traffic. Its primary purpose is to provide an efficient tool for increasing the battery life time of the pager. These groups are transmitted once or twice at the beginning of every interval (after the type 4A group at the beginning of each minute or after the first type 1A group at the beginning of each interval).



13B groups are usable for Open Data (see “Type 3A & 3B groups” on page 77)

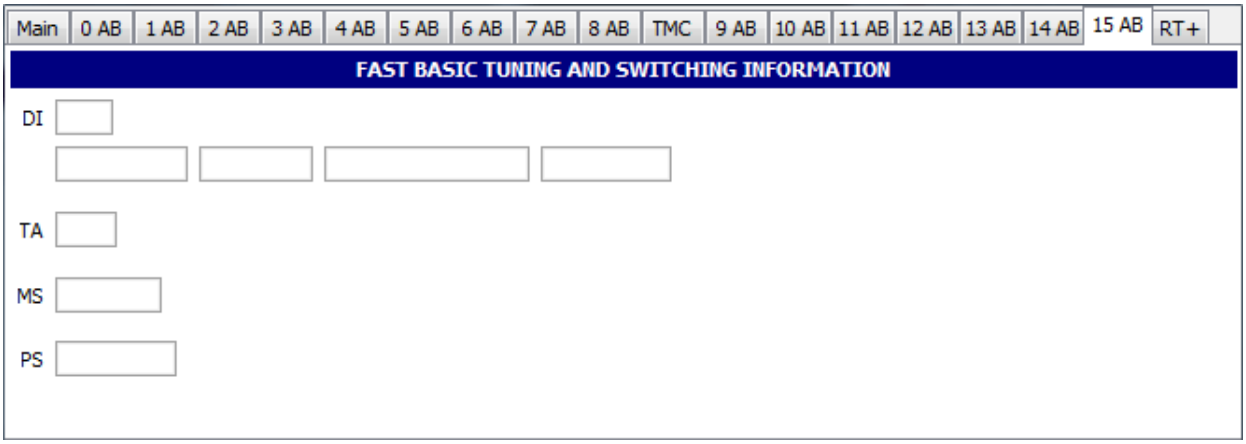
TYPE 14A & 14B GROUPS: ENHANCED OTHER NETWORKS INFORMATION (EON)

These groups are transmitted if Enhanced Other Networks information (EON) is implemented. AF codes in type 14A groups are used to refer to frequencies of other networks. There are two AF methods for transmitting this information. Variant 4 utilizes AF method A coding to transmit up to 25 frequencies; the coding method is as described above for type 0A groups. The PI code of the other network to which the AF list applies is given in block 4 of the group. Variant 5 is used for the transmission of "Mapped frequency pairs". This is used to specifically reference a frequency in the tuned network to a corresponding frequency in another network. This is particularly used by a broadcaster that transmits several different services from the same transmitter tower with the same coverage areas. The first AF code in block 3 refers to the frequency of the tuned network, the second code is the corresponding frequency of the other network identified by the PI code in block 4. Where it is necessary to map one tuning frequency to more than one VHF/FM frequency for the cross-referenced program service (due to multiple use of the tuning frequency or because the cross-referenced program is receivable at more than one frequency within the service area associated with the tuning frequency), then variants 6, 7 and 8 are used to indicate second, third and fourth mapped frequencies, respectively. LF/MF mapped frequencies are implicitly signaled by using variant 9. AF Code 250 is not used with the mapped AF method.



TYPE 15A & 15B GROUPS: FAST BASIC TUNING AND SWITCHING INFORMATION

Encoder manufactures usually eliminate this group type on new equipment. The RDS standard currently has no definition for this group. It is intended that type 15A groups should be inserted where it is desired to speed up acquisition time of the PS name. No alternative frequency information is included in 15A groups, and this group will be used to supplement type 0B groups. If alternate frequencies exist, type 0A will still be required. It is intended that type 15B groups should be inserted where it is desired to increase the repetition rate of the switching information contained in block 2 of type 0 groups without increasing the repetition rate of the other information contained in these groups. No alternative-frequency information or program-service name is included in 15B groups, and this group will be used to supplement rather than to replace type 0A or 0B groups.

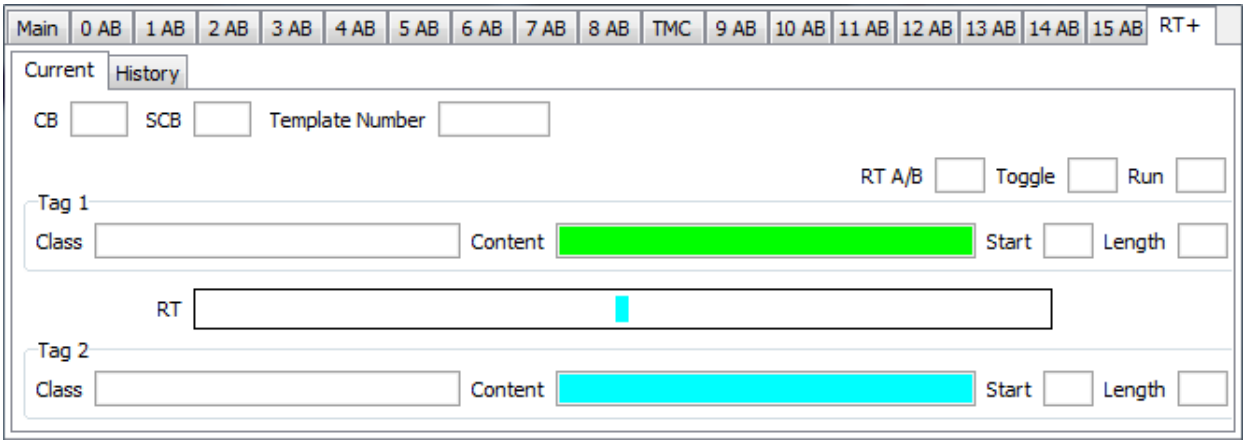


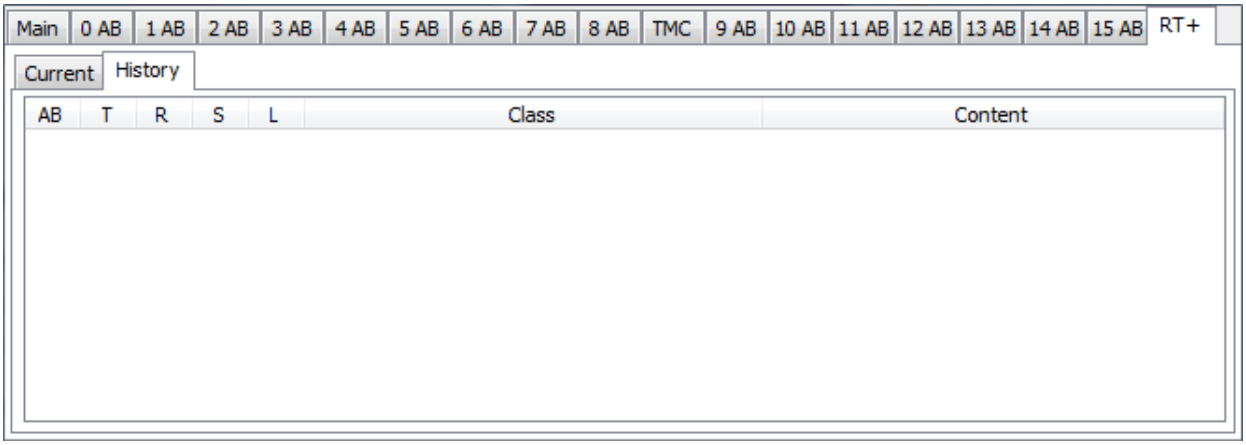
When groups of this type are transmitted, the repetition rate may be chosen to suit the application and the available channel capacity at the time.

RADIOTEXT PLUS (RT+)

RadioText Plus is “semantic analogue radio”. It allows the RDS feature RadioText (RT) to be read by the FM RDS receiving terminals. Based on the RDS RT messages, RT+ is completely backwards compatible with RT. The usage of RT+ allows the listener/user to derive additional benefits from the RDS Radio Text service. It enables FM RDS receivers to “read” Radio Text (to recognize designated objects and make them manageable) by user’s direct access to specific elements of the Radio Text messages. For example, that element could be programme associated metadata like Title and Artist of the currently playing song or a news headlines. This provides the listener with an “mp3-player feeling” while listening to analogue FM radio. The elements can also carry additional service messages or information about the Radio Station such as the telephone number or the web address of the Radio Station’s hotline. These objects, or more accurately RT+ information elements carried in the RDS RadioText (RT) messages, are identified by their location within the RT messages and by the class code of their content type. Once an information element is received and understood, a receiver is able to, for example, store the different RT+ information elements and the listener may then select and request a specific content type from the radio’s memory at an instant in time that suits the listener’s needs. Thus the listener is no longer forced to watch the RT information passing (scrolling) by. Moreover, RT+ offers selected RT message elements to car drivers on a static display, without risk of distracting the attention of the driver. Furthermore, RT+ is well suited for mobile phones with built-in FM receivers: telephone numbers can be directly used to initiate calls, and web addresses can be used to start browsing the web content offered by the radio programme provider. Last but not least, RT+ is also used for satellite radio broadcasting via DVB-S. It may be adopted by DRM and DAB in the future, too

All additional information necessary for implementing the RT+ service is carried in the RDS group 3A and in an appropriate RDS ODA group.





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APPENDIX C.1

PTY Code Description Used in RBDS Mode – North America

PTY	Short Name	Description
1	News	News reports, either local or network in origin.
2	Information	Programming that is intended to impart advice.
3	Sports	Sports reporting, commentary, and/or live event coverage, either local or network in origin.
4	Talk	Call-in and/or interview talk shows either local or national in origin.
5	Rock	Album cuts.
6	Classic Rock	Rock oriented oldies, often mixed with hit oldies, from a decade or more ago.
7	Adult Hits	An up-tempo contemporary hits format with no hard rock and no rap.
8	Soft Rock	Album cuts with a generally soft tempo.
9	Top 40	Current hits, often encompassing a variety of rock styles.
10	Country	Country music, including contemporary and traditional styles.
11	Oldies	Popular music, usually rock, with 80% or greater non-current music.
12	Soft	A cross between adult hits and classical, primarily non-current softrock originals.
13	Nostalgia	Big-band music.
14	Jazz	Mostly instrumental, includes both traditional jazz and more modern “smooth jazz.”
15	Classical	Mostly instrumentals, usually orchestral or symphonic music.
16	Rhythm and Blues	A wide range of musical styles, often called “urban contemporary.”
17	Soft R and B	Rhythm and blues with a generally soft tempo.
18	Foreign Language	Any programming format in a language other than English.
19	Religious Music	Music programming with religious lyrics.
20	Religious Talk	Call-in shows, interview programs, etc. with a religious theme.
21	Personality	A radio show where the on-air personality is the main attraction.
22	Public	Programming that is supported by listeners and/or corporate sponsors instead of advertising.
23	College	Programming produced by a college or university radio station.
24-28	Unassigned	
29	Weather	Weather forecasts or bulletins that are non-emergency in nature.
30	Emergency Test	Broadcast when testing emergency broadcast equipment or receivers. Not intended for searching or dynamic switching for consumer receivers. Receivers may, if desired, display “TEST” or “Emergency Test”.
31	Emergency	Emergency announcement made under exceptional circumstances to give warning of events causing danger of a general nature. Not to be used for searching - only used in a receiver for dynamic switching.

NOTE: These definitions can differ slightly between various language versions.

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APPENDIX C.2

PTY Code Description Used in RDS Mode – Europe, Asia

PTY	Short Name	Description
1	News	Short accounts of facts, events and publicly expressed views, reportage and actuality.
2	Current affairs	Topical program expanding or enlarging upon the news, generally in different presentation style or concept, including debate, or analysis.
3	Information	Program the purpose of which is to impart advice in the widest sense.
4	Sport	Program concerned with any aspect of sport.
5	Education	Program intended primarily to educate, of which the formal element is fundamental.
6	Drama	All radio plays and serials.
7	Culture	Programs concerned with any aspect of national or regional culture.
8	Science	Programs about the natural sciences and technology.
9	Varied	Used for mainly speech-based programs usually of light-entertainment nature, not covered by other categories. Examples include: quizzes, games, personality interviews.
10	Pop	Commercial music, which would generally be considered to be of current popular appeal, often featuring in current or recent record sales charts.
11	Rock	Contemporary modern music, usually written and performed by young musicians.
12	Easy Listening	Current contemporary music considered to be “easy-listening”, as opposed to Pop, Rock or Classical, or one of the specialized music styles, Jazz, Folk or Country. Music in this category is often but not always, vocal, and usually of short duration.
13	Light classics	Classical Musical for general, rather than specialist appreciation. Examples of music in this category are instrumental music, and vocal or choral works.
14	Serious classics	Performances of major orchestral works, symphonies, chamber music etc., and including Grand Opera.
15	Other music	Musical styles not fitting into any of the other categories. Particularly used for specialist music of which Rhythm & Blues and Reggae are examples.
16	Weather	Weather reports and forecasts and Meteorological information.
17	Finance	Stock Market reports, commerce, trading etc.
18	Children’s programs	For programs targeted at a young audience, primarily for entertainment and interest, rather than where the objective is to educate.
19	Social Affairs	Programs about people and things that influence them individually or in groups. Includes: sociology, history, geography, psychology and society.
20	Religion	Any aspect of beliefs and faiths, involving a God or Gods, the nature of existence and ethics.
21	Phone In	Involving members of the public expressing their views either by phone or at a public forum.
22	Travel	Features and programs concerned with travel to near and far destinations, package tours and travel ideas and opportunities. Not for use for Announcements about problems, delays, or roadworks affecting immediate travel where TP/TA should be used.
23	Leisure	Programs concerned with recreational activities in which the listener might participate. Examples include, Gardening, Fishing, Antique collecting, Cooking, Food & Wine etc.
24	Jazz Music	Polyphonic, syncopated music characterized by improvisation.
25	Country Music	Songs which originate from, or continue the musical tradition of the American Southern States. Characterized by a straightforward melody and narrative story line.
26	National Music	Current Popular Music of the Nation or Region in that country’s language, as opposed to International ‘Pop’ which is usually US or UK inspired and in English.
27	Oldies Music	Music from the so-called “golden age” of popular music.
28	Folk Music	Music which has its roots in the musical culture of a particular nation, usually played on acoustic instruments. The narrative or story may be based on historical events or people.
29	Documentary	Program concerned with factual matters, presented in an investigative style.
30	Alarm Test	Broadcast when testing emergency broadcast equipment or receivers. Not intended for searching or dynamic switching for consumer receivers.. Receivers may, if desired, display “TEST” or “Alarm Test”.
31	Alarm	Emergency announcement made under exceptional circumstances to give warning of events causing danger of a general nature. Not to be used for searching - only used in a receiver for dynamic switching.